



Varstvo spomenikov

Journal for
the Protection
of Monuments

51

Zavod za varstvo
kulturne dediščine Slovenije
*Institute for the Protection of
Cultural Heritage of Slovenia*



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Predgovor

Pred nami je nova, 51. številka Varstva spomenikov, tokrat s šestimi aktualnimi razpravami.

Andrej Gaspari, David Badovinac, Borut Mavrič, Maks Merala, Matej Dolenc, Sašo Poglajen, Matej Draksler in Rene Masaryk v prvem predstavljenem članku *Dokumentiranje arheoloških najdišč na odprtem morju severozahodno od Pirana v letu 2018 in začetne ugotovitve o razbitini ladje EŠD 29403* predstavljajo glavne rezultate identifikacije in dokumentiranja podvodnih arheoloških najdišč na odprtem morju. Gre za lokacije severozahodno od Pirana in predstavitev dvo-dnevne akcije, ki je potekala leta 2018 pod okriljem Zavoda za varstvo kulturne dediščine Slovenije.

Članek *Jožef Straub na Slovenskem, raziskave in konservatorsko-restavratorski posegi*, ki sta ga pripravili Saša Dolinšek in Katja Kavklar, je rezultat obsežnega projekta TrArS (Tracing the Art of the Straub Family), ki se je leta 2019 zaključil tudi z obsežno monografijo *Tracing the Art of the Straub Family*. Monografija predstavlja delo članov družine Straub, ki so živeli in delali v današnji Nemčiji, Avstriji, Hrvaški in Sloveniji. Avtorici v razširjenem in poglobljenem članku za Varstvo spomenikov predstavljata rezultate mikroskopskih in spektroskopskih analiz in konservatorsko-restavratorske posege na delih Jožefa Strauba. Vključene so tudi polikromirane plastike z velikega oltarja v Studencih, ki so danes razstavljene v Pokrajinskem muzeju v Mariboru. V Sloveniji so v okviru projekta med terenskimi ogledi Straubovih del v dveh cerkvah odkrili zelo poškodovane umetnine in so jih, da bi jih rešili nadaljnjega propada, prepeljali v restavratorski atelje Restavratorskega centra v Ljubljani.

Članek *Obnova stropa v ladji cerkve Gospodovega oznanjenja Mariji na Kostanjevici* avtoric Minke Osojnik in Marte Bensa opisuje obsežen in zahteven projekt v dveh letih uspešno zaključenega prvega segmenta restavratorskih obnovitvenih del v notranjščini cerkve. Hkrati je predstavljen uvod v obnovo celotne notranjščine cerkve v letu 2019. Pohvalno je, da je obnovo spremljala tudi popularizacija dediščine, od sprotnega obveščanja lokalne skupnosti o poteku del do vodstev in delavnic za otroke, mladino in odrasle.

Primož Pavlin v kratkem znanstvenem prispevku predstavlja *Bronastodobni depo iz Cajnarjev pri Cerknici*, ki ga po svoji sestavi uvršča med depoje, sestavljene iz ene zvrsti predmetov, v tem primeru iz dveh srpov. Avtor s predstavljenim primerom potrjuje, da so enozvrstni depoji (v tem primeru iz jezičastoročajnih srpov z nepreluknjanim ročajem) omejeni na določena območja in da se ta med seboj izključujejo.

V sklopu projekta Interreg Refresh sta Ana Plestenjak in Neža Čebren Lipovec pripravili prispevek z naslovom *Izho-dišča prenove skladišč soli Monfort in Grando v Portorožu*. V njem predstavljata razvoj objektov, njune značilnosti in stanje ter upravljalvske vidike kot tudi možnosti vključevanja kreativne industrije v oživiljanje opuščanih skladišč soli. Posebej je predstavljena metoda ocenjevanja ustreznosti predlaganih novih rab glede na individualne omejitve posameznega objekta. Na osnovi tega predstavljata izbor ustreznih novih funkcij, ki združujejo tako željo po razvoju kulturne in kreativne industrije v občini kot tudi potrebe lokalnega prebivalstva.

Miha Murko je pripravil prispevek *Arheološka izkopavanja na območju predvidene gradnje nadvišanja za umik divjadi za HE Brežice*, ki so podala skromne dokaze o antropogeni uporabi raziskovanega prostora v preteklosti. Avtor predstavlja na novo odkrito novoveško jamo ter ruševino in ostanke temeljev manjšega objekta. Članek vključuje tudi katalog najdb.

V Poglavju *Predstavitve* smo tokrat izbrali pomembno temo, in sicer mednarodne dokumente s področja varovanja in ohranjanja dediščine.

Marko Stokin in Anja Vintar sta za Varstvo spomenikov pregledala in zgoščeno predstavila najnovejši dokument s tega področja – ICOMOS-ove Salalaské smernice.

Zanimivo, iskrivo in poučno branje vam želim.

Biserka Ribnikar Vasle, urednica



Foreword

Welcome to the 51st edition of *Varstvo spomenikov/Journal for the Protection of Monuments*, containing six very topical papers.

The first paper *Documentation of archaeological sites in the open sea north-west of Piran in 2018 and initial findings on shipwreck EŠD 29403* by Andrej Gaspari, David Badovinac, Borut Mavrič, Maks Merela, Matej Dolenc, Sašo Poglajen, Matej Draksler and Rene Masaryk presents the main results of the identification and documentation of underwater archaeological sites in the open sea north-west of Piran conducted over two days in August 2018 under the aegis of the Institute for the Protection of Cultural Heritage of Slovenia.

The paper *Jožef Straub in Slovenia, research and conservation-restoration interventions*, by Saša Dolinšek and Katja Kavklar, is the result of the wide-ranging project TrArS (Tracing the Art of the Straub Family), which concluded in 2019 with the extensive monograph *Tracing the Art of the Straub Family*. The monograph presents the work of the members of the Straub family who lived and worked in present-day Germany, Austria, Croatia and Slovenia. In their expanded and in-depth paper for *Varstvo spomenikov*, the authors present the results of microscopic and spectroscopic analyses and conservation-restoration interventions on the works of Joseph Straub. These also cover the polychromed wooden sculptures from the high altar in Studenci that are today exhibited at the Maribor Regional Museum. In the context of the TrArS project in Slovenia, field inspections of Straub's works in two churches revealed a number of badly damaged artworks. These were transferred to the workshop of the ZVKDS Restoration Centre in Ljubljana to prevent their further degradation.

The paper, *Restoration of the nave ceiling in the Church of the Annunciation in Kostanjevica* by Minka Osojnik and Marta Bensa, describes an extensive and demanding project which over the course of two years successfully concluded the first segment of restoration and repair work in the interior of the church. At the same time the presented project served as an introduction to the restoration of the entire interior of the church in 2019. It is gratifying that the renovation was accompanied by a popularisation of heritage, which included keeping the local community informed about the progress of the works and the organisation of guided visits and workshops for children, youngsters and adults.

Primož Pavlin's brief paper presents *A Bronze Age hoard from Cajnarje near Cerknica*, which in terms of its composition is classified as a hoard consisting of a single type of object

(known in German as a *reine Hortfunde* or "pure hoard"), in this case two sickles. Through the case presented in the paper, the author confirms that single-type hoards (in our case consisting of tanged sickles with unperforated tangs) are limited to specific areas and are mutually exclusive.

As part of the Interreg project REFREsh, Ana Plestenjak and Neža Čebren Lipovec prepared the paper *Starting points for the renovation of the Monfort and Grando salt warehouses in Portorož*. They present the development of the two buildings, their characteristics and condition, aspects relating to their management and possibilities for the inclusion of the cultural and creative industries in the revitalisation of the abandoned salt warehouses. The paper also includes a separate presentation of the method of assessing the suitability of proposed new uses with regard to the individual limitations presented by each individual structure. The authors use this as a basis to present a selection of suitable new functions that combine both the desire for development of the cultural and creative industries in the municipality and the needs of the local population.

Miha Murko's paper *Archaeological excavations in the area of the planned wildlife escape structure at the Brežice hydropower plant* provides limited evidence of past human use of the area under consideration. The author presents a newly discovered pit dating from the early modern period and the ruins and remains of the foundations of a small building. The article also includes a catalogue of finds.

For the *Presentations* section of this issue, we have chosen the important topic of international documents covering the protection and conservation of heritage.

Marko Stokin and Anja Vintar review and briefly present the latest document in this field, ICOMOS's Salalah Guidelines, for *Varstvo spomenikov*.

I hope you find this edition of the journal interesting, stimulating and instructive.

Biserka Ribnikar Vasle, Editor

Andrej Gaspari, David Badovinac, Borut Mavrič, Maks Merela, Matej Dolenc,
Sašo Poglajen, Matej Draksler, Rene Masaryk

Dokumentiranje arheoloških najdišč na odprtem morju severozahodno od Pirana v letu 2018 in začetne ugotovitve o razbitini ladje EŠD 29403

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Izvleček

Prispevek predstavlja glavne rezultate identifikacije in dokumentiranja podvodnih arheoloških najdišč na odprtem morju severozahodno od Pirana, ki so ju pod okriljem Zavoda za varstvo kulturne dediščine Slovenije v dvodnevni akciji avgusta 2018 izvedli arheologi Zavoda za podvodno arheologijo v sodelovanju s strokovnjaki Morske biološke postaje Piran Nacionalnega inštituta za biologijo. V okviru arheoloških rezultatov akcije v letu 2018 izstopa identifikacija z batigrafsko izmero ugotovljene anomalije EŠD 29403 kot razbitine večjega plovila, ki ga je mogoče na podlagi dokumentiranih dimenzij in konstrukcijskih značilnosti ogrodja in oplate, radiometrične datacije in uporabe pločevine iz kovne medenine, s katero je bila obita zunanost trupa, ter odsotnosti prepoznavnih najdb vojaškega značaja opredeliti kot razbitino trgovske dvojbornice, dolge med 24 in 36 metrov, ki je potonila v sredini ali drugi polovici 19.

stoletja. Na ladjo dolge ali velike priobalne plovbe (morda brig, brigškuner ali večji loger oziroma dvojborni škuner) s konca dobe lesenih jadrnic kažejo tudi dimenzije zakovic za spajanje glavnih delov korita. Predlagani dataciji ustreza tudi kolut škripca pripone ali natege snasti, izdelan iz lesa gvajaka (*Guaiacum* spp) in opremljen s prešanim ležajem iz grafita, katerega uporaba se je razmahnila v sredini 19. stoletja. Kombinacija materialov, iz katerih je bil narejen kolut, odkrit nekaj metrov od razbitine, bi lahko nakazovala, da je bila ladja, v celoti ali vsaj del njene opreme, morda izdelana v ladjedelniških središčih v Angliji ali na vzhodni obali ZDA.

Površinski pregled ostalih dveh značilnosti (EŠD 29401 in 29402) ni prinesel najdb, ki bi dopuščale sklepanje o obstoju pokopanih ladijskih razbitin, zato bodo za opredelitev značaja teh predelov dvignjenega trdnega dna potrebne

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nadaljnje raziskave. Vsa preiskana območja so pomembna tudi z vidika biodiverzitete in varstva narave, poleg tega pa ima poglobljeno poznavanje prisotnih vrst neposredno uporabno vrednost za identifikacijo arheoloških ostalin in načrtovanje ukrepov varstva.

Uvod

Neformalna delovna skupina za podvodno kulturno dediščino pri Direktoratu za kulturno dediščino Ministrstva za kulturo je na več sestankih med jesenjo 2016 in poletjem 2017 pripravila strateško-programsko naravnani dokument Zasnova programa integriranih raziskav in izhodišč za pripravo načrta upravljanja podvodne kulturne dediščine slovenskega morja (Gaspari idr., 2018). Na predlog svetovalcev Ministrstva za kulturo je bil dokumentu priključen akcijski načrt prioritarnih raziskav (2018–2019), ki bi jih bilo glede na njihova izhodišča in cilje, pa tudi historično perspektivo, v okviru katere je arheološko raziskovanje slovenskega podvodja tradicionalno koordinirala spomeniška služba, najprimerneje izvesti s skupino strokovnjakov pod okriljem Zavoda za varstvo kulturne dediščine Slovenije (ZVKDS).

Predloženi akcijski načrt je izhajal iz neizogibnega spoznanja, da razpoložljivi podatki o kulturni dediščini na morskem dnu slovenskega dela Tržaškega zaliva ne omogočajo celovitega vrednotenja pomena in ogroženosti registriranih podvodnih najdišč, saj je trenutno poznavanje večjega dela enot za ta namen bistveno preskromno. Določitev raziskovalnih prioritet je bila zato utemeljena na nujni potrebi po zgostitvi podatkov o arheološkem potencialu antropogenih in naravnih fenomenov na prostorsko zaključenih območjih odprtega morja.

V okviru usklajevanja fokusa nalog in optimizacije porabe namenskih sredstev v okviru programa dela in finančnega načrta ZVKDS za leto 2018 so bile za prednostno obravnavo izbrane tri lokacije iz sklopa prve prioritete, tj. rekonstrukcija in šibkoinvazivnih raziskav za določitev arheološkega potenciala anomalij severno od Savudrije oziroma severozahodno od Pirana, ki so bile na podlagi analize podatkov visokoresolucijske batimetrije prepoznane kot lokacije domnevnih potopljenih plovil (slika 1).

V okviru koncepta, ki arheološke ostaline obravnava kot integralni del morskega okolja, so bili k sodelovanju pritegnjeni strokovnjaki Morske biološke postaje Piran. Večji del dna slovenskega morja, vključno z območjem ciljne skupine anomalij, namreč sestavlja mehak premičen sediment, trdne podlage naravnega izvora pa praktično ni. Dno večinoma sestavlja mulj ali peščeni mulj, vsebnost peska in organske komponente pa se večja proti zahodu oziroma jugozahodu, kjer se pojavlja tudi biocenoza obrežnega detritičnega dna, za katero je značilna bogata epifavna (Lipej idr., 2018). Ladijske razbitine in drugi artefakti v takem

okolju močno povečajo habitatsko raznolikost. Tako nastale otočke trdega dna naselijo številni organizmi, ki se na mehkem substratu ne pojavljajo, s čimer se poveča vrstna pestrost območja. Take ostaline tako niso pomembne zgolj z arheološkega in kulturnozgodovinskega vidika, ampak tudi z ekološkega. Predstavljajo vroče točke biodiverzitete (Leewis idr., 2000).

Po prvotnem načrtu naj bi se posegi osredotočili na lokacije EŠD 29404, 29405 in 29406, ki ležijo v osrednjem območju t. i. sipin sz. od Pirana, nato pa so bile zaradi potencialnih zapletov v zvezi s potekom meje, ki je bila določena z arbitražnim postopkom, izbrane tri druge lokacije iz prioritete skupine, ki ležijo severneje, in sicer na območju, kjer omenjene sipine prehajajo proti globljim delom Tržaškega zaliva. Obravnavane lokacije so v register nepremične kulturne dediščine vpisane pod evidenčnimi števkami dediščine (EŠD): 29401 – barka NW III., 29402 – barka NW II. in 29403 – barka T NW I. Ta prispevek se osredotoča na zadnjo lokacijo, celovito poročilo o izvedenih posegih na vseh treh lokacijah pa je hranjeno v arhivu naročnika (Badovinac idr., 2018).

Potek in metodologija terenskih del

Terenska dela so potekala v skladu s predhodno zasnovanim in potrjenim načrtom zaporedja naslednjih sklopov postopkov:

1. identifikacija in strukturni pregled anomalije ter dokumentiranje trenutnega stanja ostalin/struktur z visokoresolucijsko večslikovno 3D-fotogrametrijo;
2. vzorčenje za potrebe izvedbe ocene arheološkega potenciala najdišča (radiokarbonsko datiranje/dendrokronologija; vzorčenje premičnih arheoloških najdb) ter biološke (bentoške združbe) in geološke karakterizacije (značilnosti dna in dinamike sprememb) območja anomalije;
3. določitev mikroreferenčnih območij za opazovanje zaraščanja in sprememb v sedimentaciji/eroziji in postavitev markerjev za nadaljnje spremljanje;
4. ekstenzivni pregled neposredne okolice anomalije (pribl. 100 x 100 m);
5. izdelava poročila s predlogi nadaljnjih raziskav ter ukrepov varstva.

Terenska dela je izvedla ekipa Zavoda za podvodno arheologijo (David Badovinac, Matej Draksler, Rene Masaryk, Aleš Tiran in Rok Klasinc) v sodelovanju s strokovnjaki Morske biološke postaje Piran Nacionalnega inštituta za biologijo – MBP NIB (Borut Mavrič, Tihomir Makovec in Matej Marinac). Morska biološka postaja je prevzela celotno potapljaško logistiko in omogočila uporabo raziskovalnega čolna Sagitta. Akcija je bila izvedena v dveh delovnih dneh, in sicer so bili 9. 8. 2018 opravljeni potopi na lokaciji EŠD 29402,

10. 8. 2018 pa na lokacijah EŠD 29401 in EŠD 29403. Skupno je bilo opravljenih 16 posamičnih potopov, tj. 8 potopov z dvema potapljačema, trajali pa so do 35 minut.

Za vse tri lokacije so bili prehodno pripravljene dosjeji z batimetričnimi načrti, podatki o dimenzijah, oblikovanosti in globlinah anomalije ter geografskimi koordinatami položaja centroidov. Te so bile uporabljene kot točke vstopa na posamezne lokacije oziroma kot izhodišča pregledov, za kar so služile odvržene uteži z bojo.

Obravnavana območja so bila pred potopi pregledana s spuščanjem IP-kamere, dodatne predhodne informacije o oblikovanosti površja morskega dna pa so bile pridobljene s pametnim sonarjem Deeper PRO+ z brezžično povezavo s sprejemno enoto.

Za arheološki pregled morskega dna je bila izbrana krožna tehnika preiskovanja v smeri urnega kazalca, in sicer s pomočjo tračnega metra, pripetega na utež označevalne boje. Potopi so se snemali z GoPro kamero, najdbe in ostanki konstrukcij pa so bili poleg ročne izmere in opisa detajlno dokumentirani s fotoaparatom Nikon d800 s kupolasto lečo za potrebe izdelave fotogrametričnega modela, ki je bil izdelan s pomočjo programa Agisoft Photoscan. Model se je umeščal s pomočjo vodoravno položenih trasirk z izmerjenim azimutom.

V okviru arheološkega pregleda so bile določene smeri linearnih transektov, po katerih sta člana MIB izvedla videonemanje za potrebe biološke karakterizacije lokacije. Gre za v morski biologiji uveljavljeno metodo, ki na hiter, učinkovit, predvsem pa nedestruktiven način omogoča opredelitev favne, flore in habitatnih tipov na nekem območju (Lipej idr., 2003). Pri metodi linearnega transekta snemalec s podvodno videokamero posname vse habitatne tipe, ki si sledijo vzdolž merilnega traku, položenega pravokotno ali vzporedno na opazovano morfološko značilnost (Lipej idr., 1999).

Lokacija 29403

Potek dela

Izhodišče pregleda je bilo postavljeno 7,5 m jv. od sredinskega dela anomalije. Vidljivost je bila okoli 8 m, zato je bilo ob spustu na lokacijo takoj zaznati temno liso v smeri proti SZ, ki se je izkazala za razbitino večje lesene ladje v osrednjem delu območja batigrafske anomalije. Po razmestitvi označb za fotogrametrijo so se začele izmere in dokumentiranje izpostavljenih delov plovila, ki sta jim sledila pregled in opis značilnosti območja v dolžini 50 m in širini do 10 m (slika 2). V okviru definiranih ciljev posega sta bila odvzeta vzorec plovila za radiometrično analizo in določitev vrste lesa ter vzorec kovinske pločevine z zunanje oplate za kemijsko analizo. Z lokacije je bil zaradi potreb

tipokronološke opredelitve dvignjen tudi kolot škripčevja, ki bo po končanih preiskavah predan v trajno hrambo Pomorskemu muzeju »Sergej Mašera« Piran.

V zadnjem od skupno treh potopov na lokaciji je ekipa MBP NIB vzporedno z osjo plovila – vzdolžne simetrale (tj. linije, ki poteka vzdolž sredine ladje in jo po dolžini deli na levo in desno simetrično polovico) – postavila linijo transekta ter v nadaljevanju izvedla videodokumentiranje za potrebe biološke karakterizacije. Posnet je bil 50 m dolg in približno 2 m širok pas, ki je segal čez celotno dolžino batigrafske anomalije.

Opis najdišča ladijske razbitine

Na batimetričnem načrtu jasno opazna ovalna anomalija je po daljši osi usmerjena SV–JZ pod azimutom 68 stopinj (slika 3). Območje anomalije z dolžino 52 m in širino 18 m ima skupno površino 683 m². Morfologija nakazuje zaobljen sredinski greben na globini 22 m, ki se dviga nad okolico za dobrih 60 cm in ga na jz. strani spremlja manjši greben s plitvim podaljškom v sz. smeri.

Osrednji greben se je med pregledom izkazal za delno z muljem in peskom prekrite ostanke lesene konstrukcije večjega plovila, na batimetriji vidne depresije pa za do 1 m globoke izkope morskimi živali, predvsem jastogov (*H. gammarus*). V širši okolici je opaziti močno poraščenost in bistveno spremembo bentoških združb običajnega peščenega dna.

Najbolj prepoznaven je osrednji del razbitine lesene ladje s kovinsko zaščito podvodnega dela trupa, masivnim ogrodjem, leseno oplato in vzdolžno potekajočo široko gredo, ki je glede na simetrijo z linijo bokov verjetno hrbtenica ladje in nakazuje usmeritev plovila (slike 4–7). Na območju razbitine so bili opaženi različni kosi kovinskih elementov, katerih funkcije zaradi močne poraščenosti večinoma ni bilo mogoče določiti. Med prepoznavnimi deli, ki nedvomno pripadajo ladijski konstrukciji, je več daljših kovinskih valjastih spon – zakovic, vidni pa so bili tudi različni ostanki modernih smeti (plastika, blago, vrvi), ki so bili verjetno na lokacijo prineseni s pridenjenimi mrežami.

Izpostavljeni osrednji del razbitine se nato v smeri proti vzhodu in zahodu izklini pod pesek in mulj. V nadaljevanju proti vzhodu je mogoče slediti liniji železne verige, ki se konča v ovalni depresiji (dolžina 6,3 m; širina 2,3 m; globina 0,8 m); tu je ponovno viden večji lesen del konstrukcije (slika 8), katerega usmeritev sovпада s hrbtenico ladje. Na robu depresije, v kateri ležijo kosi zaraščenih kovinskih elementov, je vidna železna členasta veriga, ki se vleče v smeri dodatnih 4 m proti sredini razbitine, dokler ne izgine v pesku. Razdalja od roba depresije do začetka izpostavljenega dela ladje je 13,5 m. Območje z izpostavljenim osrednjim delom ladijske konstrukcije meri 11,3 m in je široko do 3 m. Razbitina je na severni strani izpostavljena do roba zunanje oplate, južno od linije hrbtenice pa jo prekriva

mulj. Proti zahodu je nato razbitina skoraj popolnoma zakrita, površina dna pa postaja vedno bolj homogena; ponekod je mogoče slediti sredinski liniji hrbtenice, dokler ta v celoti ne izgine v sedimentih. Na skrajno zahodni strani pregledanega območja je bil lociran visok skupek zveržene kovine v izmeri 2 x 2 m, ki ga je mogoče povezati z razbitino (slika 9). Predel med izpostavljenim delom razbitine in kovinskimi deli je prekrit z muljem in peskom ter manjšimi koraligenimi skupki. Celotno območje pojavljajo ostankov plovila od skrajnega roba depresije na vzhodu do skupka zveržene kovine na zahodu meri 32 m. Pri površinskem pregledu dna v okolici razbitine je bil okoli 5–7 m južno od hrbtenice v smeri boje najden lesen kolot škripca – bloka (slika 10). Pripadnost koluta razbitini se zdi verjetna, vendar ni mogoče povsem izključiti možnosti, da ne gre za del iste razbitine in da je pojav koluta na tej lokaciji povezan z vleko pridnenih mrež.

Opis izpostavljenih delov razbitine

Dokumentirani in izmerjeni so bili samo izpostavljeni oziroma na površini vidni deli razbitine, brez kakršnegakoli dodatnega odstranjevanja sedimentov oziroma posega v najdišče.

Na severni strani ostanke plovila jasno zamejuje linija pločevine iz kovne medenine, s katero je bila obita lesena zunanja oplata korita. Zaščitno oplato sestavljajo podolgovate pravokotne plošče debeline do 2 mm, ki so bile na vzdolžno potekajoče platice zunanje oplate z ohranjeno debelino okoli 3 cm pritrjene z majhnimi žeblički. Ti sicer niso bili vidni, vendar o načinu pritrditve pričajo luknje tik ob povsem ravnem robu vidnega dela pločevine (slika 11). Na izpostavljenem boku je bilo dokumentiranih 16 parno postavljenih reber širine 30 cm in debeline do 25 cm v razmiku 15 cm (slika 12). Pare verjetno sestavljajo rebrnice, tj. rebra, ki so vpeta na gredelj, in nanje pritrjena rebra oziroma rebrni podaljški, ki se v krivini boka plovila dvigajo proti palubi. Na notranjo stran reber in rebrnic so bile pritrjene okoli 4 cm debele platice notranje oplate. Dolžin posameznih platic ni bilo mogoče ugotoviti, o načinu spajanja elementov boka pa pričata dve dokumentirani valjasti zakovici z dolžino okoli 80 cm, ki sta glede na odsotnost za železne predmete iz morja značilne konkretije verjetno izdelani iz ene od bakrovih zlitin (slika 13).

Najmarkantnejši del razbitine je v dolžini 11,2 m dokumentiran del ladijske hrbtenice s širino med 38 in 39,5 cm ter neugotovljeno debelino (slika 14). Gre za horizontalno gredo, ki je nameščena nad rebrnicami, kjer te prečkajo (zunanjo) kobilico. Laboratorijska preiskava je pokazala, da gre za les hrasta (*Quercus* spp). Hrbtenica se pod peskom nadaljuje v obeh smereh, pri čemer je bila na zahodni strani dokumentirana še v petmetrskem segmentu; glede na ujemanje z njeno osjo v osrednjem delu območja je mogoče istemu konstrukcijskemu elementu pripisati tudi 1,5 metra

dolg in 40 cm širok del grede na vzhodni strani anomalije. Dokumentirana situacija nakazuje, da je na lokaciji ohranjen spodnji del ladijskega korita v dolžini vsaj 24 m. Na osrednjem delu dokumentiranega segmenta hrbtenice je vidna pravokotna, zaboju podobna struktura, ki simetrično obdaja gredo (slika 15). Njeni daljši stranici, ki potekata vzdolžno s hrbtenico, merita 1,5 m, ožji prečni stranici pa 1,3 m. Struktura je sestavljena iz dveh prečnih tramov z debelino med 20 in 25 cm ter dveh vzdolžnih desk debeline 4 cm. Na severovzhodni strani se nanjo navezuje podobna konstrukcija trapezaste oblike, ki na krajši prečni stranici meri 0,77 m, na daljši pa 1,1 m. Dolga je natančno 0,86 m in sestavljena iz tramov širine 5 cm.

Radiometrična analiza

Rezultat radiometrične (AMS) analize odvzetega vzorca lesa hrbtenice (VZ-1001; Beta-503982), izvedene v laboratoriju Beta Analytic (Miami, Florida), ima za kronološko umestitev ladje le omejeno vrednost. Analiza je pokazala konvencionalno radiokarbonsko starost 260 ± 30 BP, kar pomeni, da so branike izbranega drevesa na vzorčenem mestu z 68,2-odstotno verjetnostjo rasle med letoma 1630 in 1795 (slika 16).

Komentar k dokumentiranim ostankom plovila

Konstrukcija

Pri poskusu preliminarne tipološko-kronološke opredelitve plovila se opiramo na dokumentirane strukturne in tehnološke značilnosti ohranjenih delov korita, oblikovanost zunanje krivine boka in ocenjeno dolžino vodne linije ter uporabljene materiale in rezultat radiometrične analize odvzetega vzorca hrbtenice.

Projekcija linij bočne oplate in hrbtenice nakazuje, da gre za ostanke najnižjega dela korita ladje, katere dolžine trenutno ni mogoče zanesljivo oceniti, je pa ta na kobilici verjetno znašala nekje med 24 in 36 m, ni izključena niti dolžina okoli 40 m. Preslikava dokumentirane linije boka čez vzdolžno os ladje kaže na razmeroma sloko, vendar zelo masivno grajeno plovilo.

Opazovane dele konstrukcije korita zaznamujejo močna hrbtenica, parno razmeščene rebrnice in rebra z delom notranje oplate ter zunanja oplata, obita s pločevino iz kovne medenine.

Način spajanja ogrodja in oplate ni bil ugotovljen. Veliki zakovici iz bakrove zlitine, ki sta si precej podobni in imata en konec oblikovan v sploščeno zaobljeno glavico in opremljen z okroglo podložko, nasprotni konec pa je nekoliko stanjšan zaradi lažjega zabijanja, sta nedvomno spajali glavne dele ladijske strukture. Po dimenzijah in obliki sta podobna zakovicam, ki so segale čez spajane elemente, npr. kobilico, vložek – notranjo hrbtenico in hrbtenico, pa

tudi zakovicam za spajanje elementov zgodnjega dela korita oziroma palube (npr. nadrebra, koleno, debelejšje platice opasa). Tako imenovane zaklenjene sornike so »zapri« tako, da so po namestitvi obročka vrat stebela sploščili s kladivom. To v primeru zakovic z EŠD 29403 ni zanesljivo razvidno, nesporno pa njuna oblika kaže na najmlajše obdobje gradnje lesenih jadrnic s tekočo oplato (McCarthy, 2005: 69–72, 85–86).

Pravokotna konstrukcija, ki objema hrbtenico, je morda ostanek vodnjaka za črpalko, ker pa so ti pri jadrnicah praviloma urejeni tik ob glavnem jamboru ali pod krmnim jamborom, je možna tudi katera druga namembnost, morda kašta za balast. Balast, običajno stalno nameščen svinec, občasno, zlasti med vožnjo prazne ladje kamenje, je t. i. nekoristni tovor, ki pa izboljša predvsem prečne statične in dinamične nagibne lastnosti plovila: pri jadrnicah poveča tudi sposobnost varnega prečnega nagiba med jadrnjem oziroma predstavlja nasprotno silo sili vetra na jadra. Opisane lastnosti ogrodja z zelo masivnimi, parno razmeščenimi rebrnicami in rebri v enakomernih razmikih v bistvenem ne odstopajo od značilnosti gradnje fregat, brigov in podobnih vojnih ladij iz časa med drugo polovico 18. in koncem 19. stoletja (glej npr. Steffy, 1994: 168–186; Boudriot, 1993: 96), vendar jo ob trenutnem stanju raziskav glede na odsotnost prepoznavnih najdb (topovi, hladno orožje, oprema) ni mogoče opredeliti kot vojno ladjo. Dvojna rebra so standardna značilnost tako trgovskih jadrnic kot sodanih vojnih ladij, pri katerih pa so bili primeroma med dvojnimi rebri izmenoma nameščeni pari posamičnih reber (Steffy, 1994: slika G-12). Prostor in presledek (angl. room and space), ki obsega širino polnega rebra (par rebrnice in rebra) ter presledek do naslednjega polnega rebra, pri ladji EŠD 29403 znaša 75 cm, s čimer ustreza meram večjih vojnih ladij, kot so fregate oziroma ladje petega razreda (Godwin, 1987: 13). Pri HMS Charon, 42,7 m dolgi trojambornici z dvema palubama in baterijo 18- in 12- ali 9-funtnih topov, zgrajeni v Harwichu leta 1778, je izmerjen »prostor in presledek« znašal 71,1 cm, širina posamezne polrebrnice pa 30,5 cm (Steffy, 1994: 177). Ugotovitev o razmeroma velikih dimenzijah reber podpira tudi aplikacija pravil za gradnjo lesenih trgovskih ladij iz leta 1871 (*Regulations and Rules for the Classification of Wooden Vessels*, Veritas International Register of Shipping, Brussels), ki take dimenzije polnega rebra s presledkom (74 cm) predvideva za čez 50 metrov dolge ladje (Fernández-González, 2006: 17.57). Upoštevala je gradnjo lesenih ladij iz leta 1830 (Hedderwick, 1830: 157–161) glede odnosa med višino in širino, ki naj znaša 10–11 dvanajstin višine rebrnic pri kobilici, lahko izračunamo, da je hipotetična višina 30 cm širokih rebrnic ladje EŠD 29403 znašala okoli 33 oz. 36 cm. Iz priporočenega razmerja rebrnic do širine ladje, tj. pol palca (1,27 cm) višine rebrnice za vsak čevelj (30,48 cm) maksimalne širine ladje, tako izhaja, da je bila ladja široka okoli 7,9 oz. 8,6 m. V skladu s pozneje uveljavljenimi pravili (1871 in 1921) so 30 cm široka rebra zadoščala celo za okoli 13–15

m široke in čez 50 m dolge ladje (Fernández-González, 2006: 17.57). Pregled dimenzij ameriških trgovskih jadrnic, zgrajenih v petdesetih letih 19. stoletja, pokaže, da so med 9 in 10 m široke ladje zastopane zlasti v skupini barkov z dolžino okoli 35–45 m in nosilnostjo 550–560 ton (Charters, 2013: 10–16), podobno pa izdaja tudi pregled jadrnic dolge plovbe v popisih Pomorskega letopisa Ogrske kraljevske pomorske uprave na Reki iz let 1891–1909 (Barbalić, Marenić, 2004: 185–247). Razmerje med širino in dolžino se je pri ladjah trgovske mornarice v 19. stoletju ustalilo na približno 1 : 5.

Preseneča razmeroma skromna debelina zunanje in notranje oplate, ki se uvršča na spodnji rob predpisanega razpona (1,5–6 palcev = 3,81–15,24 cm; Hedderwick, 1830: 218–218) in je v dokumentirani debelini skoraj za polovico manjša kot pri vojnih brigih in lahkih fregatah iz druge polovice 18. in prve polovice 19. stoletja (Boudriot, 1993: 57; Steffy, 1994: 177). Tudi poznejša pravila za gradnjo trgovskih ladij za notranjo oplato velevajo 10 cm in več debele deske, za platice podvodnega dela oplate pa vsaj 11 cm (Fernández-González, 2006: 17.58).

Elipsoidno zaobljena krivina bokov najnižjega dela korita EŠD 29403 je zelo blizu linijam barka Grad Karlovac, ki je bil leta 1869 zgrajen v ladjedelnici v Kraljevicu (slika 17). Dovršeno in lepo obliko 43,58 m dolgega, 8,55 m širokega in 5,78 m visokega barka, izdelanega za večinskega lastnika Vjenceslava Turkovića, prikazuje nekaj ohranjenih oljnih slik in akvarelov, vodne linije pa načrt graditelja Vatroslava Arčanina v hrambi Pomorskega in zgodovinskega muzeja Hrvaškega primorja na Reki (Barbalić, Marenić, 2004: 116–120). Rekonstruirana krivina bokov in ocenjene dimenzije ladje ter masivnost in razporeditev elementov ogrodja podpirajo domnevo, da razbitina EŠD 24903 predstavlja ostanke trgovskega briga (it. brigantino ali brick; angl. brig), brigškurnerja (it. brigantino-goletta; angl. brigantine ali schooner brig) (slika 18) ali večjega logerja oziroma dvojambornega škunerja (it. lugher; angl. fore and aft schooner). Ob tem velja opozoriti, da so bile v 19. stoletju jadrnice razvrščane po snasti in ne po velikosti ali nosilnosti, zato je tipološka opredelitev ladje, ki temelji samo na opazovanem delu korita, zelo omejene vrednosti. Razmeroma pogosto je bilo namreč spreminjanje snasti, npr. predelava barkov v brige z odvzemanjem enega jambora, v glavnem motivirana z ekonomiko (manj jader = manj posadke = nižji stroški), zato ne presenečajo občasno neobičajne nosilnosti, navedene v pomorskih letopisih (Barbalić, Marenić, 2004: 4, 12). Brigi, ki so se v osnovi razvili iz brigantin, predstavljajo značilne predstavnike novega koncepta gradnje jadrnic kot vrhunca tisočletnih izkušenj z jadrnjem. Ta novi koncept je za razliko od starejših ladij predvideval povečanje površine jader in s tem povečanje potisne moči in posledično zelene hitrosti, obenem pa znižanje, zožitev in podaljšanje trupa z močnim gredljem. Posebna pozornost je bila namenjena balastu, saj se je sočasno močno povečala višina snasti in površina jadrovja. Trupi dobijo zaobljeno obliko z

ostrimi premci in polkrožnimi ali pravokotnimi krmami. Prostori za posadko in potnike ter tovor so docela umeščeni v notranjost trupa, ki ima le minimalno povišana premec in krmo (Kozličić, 1993: 196–197).

V 19. stoletju so bili brigi kot srednje med večjimi jadrnicami dolge plovbe namenjeni trgovski plovbi v Sredozemlju, na evropskih obalah Atlantika, deloma pa tudi oceanskim potovanjem, uporabljali pa so jih zlasti za hitre prevoze dražjega blaga. Njihova dolžina je znašala 32–42 m, širina 6,5–8,5 m, višina 4–5 m, ugrez 2–2,5 m, nosilnost pa 350–600 ton. Dva približno enako visoka jambora (krmni, glavni je pogosto nekoliko višji) sta imela 3 (starejši brigi) do 5 križnih jader, na krmnem pa še vzdolžno sošno jadro. Do spremembe v številu križnih jader je prišlo v šestdesetih letih 19. stoletja, ko se je košno jadro razdelilo na zgornje in spodnje košno jadro. Do podobnih sprememb v jadroju je prišlo tudi pri drugih jadrnicah, npr. barkih in navah. Od vzdolžnih jader so bila poleg omenjenega sošnega jadra med glavnima jamboroma včasih razpeta še tri do štiri letna (vmesna) jadra in tri do štiri prečna jadra na poševniku. Trgovski brigi so bili za obrambo pred gusarji oboroženi s topovi. Posadka je štela 10–12 oseb (Gluhonja, 1951, 59–60; Kozličić, 1993, 194–199), po drugih virih celo do 17. Prav velike posadke in s tem povezani stroški so bili vzrok, da so brige začeli počasi opuščati in so njihovo mesto ob koncu 19. stoletja prevzele druge jadrnice. Po razširjenosti na področju Jadrana in enjenosti med pomorci je med ladjami dolge plovbe in velike priobalne plovbe brig zasedal pomembno mesto v družbi barkov in brigantin. Veljal je za posebej primerne za prevoz ruskega žita iz črnomskega prostora, saj je zaradi nizkega ugreza lahko pristajal v plitvinah Črnega in Azovskega morja (glej Kozličić, 1993: 199).

Druga od omenjenih vrst tovornih dvojbornic, brigškuner, je bila prvenstveno namenjena plovbi po Sredozemlju. Po konstrukcijskih značilnostih so bili brigškunerji podobni brigom, vendar so bili praviloma manjši in so imeli manjšo nosilnost. Njihova dolžina je znašala 24–34 m, širina 6–8 m, višina 3–4 m, ugrez 1–1,5 m, nosilnost pa 200–460 ton. Na krmnem jamboru je imel brigškuner štiri do pet križnih jader, na krmnem pa sošno in vrhnje jadro. Dno je bilo obloženo z bakreno ali medeninasto oplato. Od briga se je razlikoval le po vrsti in številu jader, tako da je zahteval manj posadke, ki jo je sestavljalo 8 ali 9 oseb (Gluhonja, 1951: 57–58; Kozličić, 1993: 198).

Loger oziroma dvojborni škuner je bil največja ladja v razredu manjših tovorno-trgovskih jadrnic, namenjena veliki priobalni in preoceanski plovbi. Na Jadranu je bil loger povprečno dolg 16–24 m, širok 4–6 m, visok 2–2,5 m, z ugrezom okoli enega metra in nosilnostjo 80–222 ton. Praviloma zelo kakovostno izdelana ladja je imela trup z oblimi linijami in oblím dnom ter močno in globoko kobilico, oster in podaljšan premec ter polkrožno zaobljeno ali pravokotno oglato krmo. Razmerje med širino in dolžino plovila je znašalo okoli 1 : 3,7 do 1 : 4. Ogrodje in oplata sta bila običajno iz hrastovine. Oba jambora sta imela sošno

jadro in vrhnjačo (vrhnje jadro), med dolgim poševnikom (kosnikom) in vrhom premčnega jambora pa so bili razpeti trije ali celo štirje floki. Posadka logerja je štela 5 ali 6 oseb (glej Gluhonja 1951, 53–54; Kozličić 1993, 222–224; Simič 2013, 247–259).

V času velikega vzpona avstrijske trgovske mornarice v letih 1850–1870 so se ladjarji na prostoru Avstrijskega primorja pri nakupih ladij za čezoceanske in velike priobalne plovbe odločali predvsem za izdelke tržaških, reških, lošinskih in drugih večjih ladjedelnic v monarhiji, nekaj ladij pa je bilo kupljenih tudi v drugih evropskih ladjedelnicah, zlasti angleških, in v Ameriki (Pahor, 1969: 9–17; Terčon, 2004: 108).

Iz evidence materialnega stanja avstrijske trgovske mornarice, ki jo je v letih 1854–1918 objavljala *Annuario marittimo* pomorske vlade, izhaja, da je število brigov po letu 1867, ko je bilo zabeleženih še 137 ladij tega tipa, začelo hitro upadati kot posledica postopnega propada pomorstva na jadra in uveljavljanja parnikov. *Annuario marittimo* je leta 1888 zabeležil le še 17 brigov, zadnjega pa leta 1892. Po tem letu ga pomorske statistike ne navajajo več. Zadnji trije brigškunerji so pluli leta 1908, medtem ko je število logerjev oziroma dvojbornih škunerjev tudi v izteku opazovanega obdobja 1868–1911 ostalo podobno (42) kot na začetku (glej Terčon, 2004: 124, 140–142, tabela 5).

Zaščitno opločje

Zunanost korita je bila zaščitena z valjano pločevino iz bakrove zlitine, katere debelina znaša okoli 0,5–0,6 mm. Po zelo grobi oceni, ki temelji na teži odvzetega vzorca, je kvadratni meter opločja, domnevno sestavljenega iz podolgovatih pravokotnih kosov pločevine, tehtal nekaj nad 2,6 kg. Drug element za natančnejšo določitev starosti ladje je ponudila analiza kemične sestave pločevine. Meritev z XRF-napravo ThermoFisher Niton XL3t900S-He z integriranim modulom za merjenje sestave kovin (General mode) z naslednjimi časi snemanja za posamezni filter: Main 30, Low 30 in High 30 je bila opravljena na Oddelku za geologijo Naravoslovnotehniške fakultete Univerze v Ljubljani. Analiza je pokazala, da vzorec (VZ-1002) sestavlja zlitina bakra (61 %) in cinka (37 %), z opaznejšimi deleži pa so zastopani še svinec, železo in kositer. Rezultati analize so predstavljeni v tabeli 1.

| EŠD 29403 | Cu | Zn | Pb | Fe | Sn |
|-------------|----------|----------|---------|---------|---------|
| VZ-1002 (1) | 60,936 % | 37,329 % | 0,760 % | 0,659 % | 0,225 % |
| VZ-1002 (2) | 60,8 % | 37,6 % | 0,7 % | 0,5 % | 0,2 % |

Tabela 1

Zgodovina zaščite zunanjih delov lesene oplate pred škodljivim delovanjem školjk, morskega rastlinja in morskega svedrca (*Teredo navalis*) s kovinskimi oblogami sega v antiko, ko so v ta namen uporabljali skoraj izključno svinče-

no pločevino. Po daljšem izostanku evidence se uporaba svinčenega opločja v 16. in 17. stoletju omenja pri španskih, portugalskih in britanskih ladjah (Bingemann idr., 2000: 218–219; McCarthy, 2005: 102), vendar precej redkeje od bolj razširjenega tankega zaščitnega opločja iz borovine. V 18. stoletju je starejše metode praktično v celoti nadomestila bakrena pločevina, s katero je Nizozemska zahodno-indijska družba, verjetno posnemajoč opločenje kitajskih džunk, eksperimentirala že v 17. stoletju (Duivenvoorde, 2015: 6). Britanska admiraliteta je z bakrenim opločjem, navadno podloženim s smolo in klobučevino ter pritrjenim z bakrenimi žeblički, pričela opremljati svoje ladje v šestdesetih letih 18. stoletja. Vsa flota je bila obakrena kmalu po letu 1780 (Bingemann idr., 2000: 221–222), prve trgovske ladje pa šele kakšno desetletje pozneje, in še to sprva redko (Steffy, 1994: 174–175). Bakreno opločje se je okvirno sočasno uveljavilo tudi v drugih mornaricah (npr. Boudriot, Berti, 1993: 150–153; McCarthy, 2005: 107–109).

Velikost bakrenih plošč po standardu Kraljeve mornarice je znašala 4 čevlje (48 palcev) x 14 palcev (121,9 cm x 35,6 cm) s površino 4,3 m² ter v enem od treh standardnih težnih razredov s po 9,76 kg/m², 8,54 kg/m² in 6,71 kg/m² ter težami 4,26 kg, 3,73 kg in 2,94 kg na ploščo v debelinah 1,09 mm, 0,97 mm in 0,76 mm. Pri francoskih ladjah so plošče opločja merile v dolžino med 112 in 162 cm, v širino pa med 23 in 49 cm. Glede na ocene je bilo za francosko vojno ladjo s 120 topovi potrebnih okoli 4700 bakrenih plošč, skupaj težkih 16 ton, kar je predstavljalo 1 % skupne teže ladje (Bingemann idr., 2000: 220).

Širina britanskih plošč je bila prilagojena standardni širini platic zunanje oplate (12 palcev oziroma 30,48 cm). Obakritev je bila zasnovana tako, da so se plošče stikale na sredini med stikoma platic. Plošče so bile tako široke 36 cm, saj so morale omogočati 2,5-centimetrsko prekrivanje na spodnjem in zgornjem robu. Pred nameščanjem plošč so leseno oplato premazali s smolo, nato pa je sledila plast papirja, platna ali klobučevine. Luknje za žeblje na robovih pločevine so bile predhodno izdelane s tankim šilom, kar je zagotovilo, da predrtina ni bila večja od potrebne. Vzorec žebliččenja britanskih ladij je predvideval 3- do 4-centimetrski interval na območju prekrivanja in 10-centimetrske razmike na preostalem delu plošče, Francozi pa so uporabljali diagonalni vzorec (Staniforth, 1985: 28–30).

Pomembne prednosti bakrene pločevine, ki je zmanjšala obraščanje korita in povečala hitrost plovbe, je močno reducirala zelo škodljiv galvanski učinek kot posledica stika bakra s takrat prevladujočimi železnimi spoji (McCarthy, 2005: 103–104). Manj uspešno je bilo tudi zaščitno opločje iz cinkove pločevine, ki v morski vodi korodira podobno kot bakrena in se v galvanskem stiku z železom razmerno hitro razgradi (White, 1882: 418–419). Poskusi z novimi bakrovimi zlitinami brona (baker in kositer) in medenine (baker in cink) so bili tako usmerjeni v izkoristek odpornosti bakra proti rjavenju brez slabljenja železnih delov korita, med drugimi kovinskimi materiali za zaščito pa so

preizkušali še opločja iz železa, cina, kositra in galvaniziranega jekla (Bingemann idr., 2000: 220).

Preboj je bil dosežen z zlitino bakra in cinka (60 : 40) ter manjšo primesjo svinca, ki jo je oktobra 1832 v Angliji patentiral George Frederick Muntz (1794–1858) in tako za 14 let zavaroval pravice za njeno izdelavo in prodajo v obliki ladijskega opločja in spojev – zakovic in sornikov (Staniforth, 1985: 27; McCarthy, 2005: 115–118). Do štiridesetih let 19. stoletja je tovrstna medenina, pozneje znana kot »yellow metal« ali »Muntz metal«, v Britaniji zamenjala baker kot glavno sredstvo opločenja trgovskih ladij, v naslednjem desetletju pa se je njena uporaba razširila tudi na ladje, zgrajene v tujini in kolonijah (Staniforth, 1985: 27). Muntzeva medenina se je izkazala za zelo primerno za opločenje korit, saj je oksidirala ravno prav za odvrčanje rastlinja in vitičnjakov ter korodirala počasneje od bakra. Bila je trajnejša od bakrene medenine, poleg tega pa je bila zaradi precejšnjega deleža cinka kot relativno poceni kovine njena izdelava ekonomičnejša. Za nameček je bila lažja in močnejša od bakra, drugače od večine vrst medenine pa so jo lahko vroče valjali, kar je pomenilo, da je zahtevala samo četrtino napora in časa, potrebnega za izdelavo medenine (McCarthy, 2005: 115–116). Originalno razmerje bakra in cinka 60 : 40 je nasledila sestava 63 : 37, ki jo je bilo mogoče hladno valjati v tanjše plošče od originala. Pravokotne plošče iz zlitine v tem razmerju so znane z vrste razbitin trgovskih ladij iz druge polovice 19. stoletja, poleg oznak tvrdke Muntz pa se na njih pojavljajo tudi žigi drugih britanskih in francoskih proizvajalcev (Bingemann, 2018). Sčasoma se je izkazalo, da je Muntzeva zlitina po daljšem obdobju v morski vodi postala lomljiva, in sicer zaradi galvanskega učinka med bakrom in cinkom, ki izloči del slednjega. Tovrstne spremembe v materialu naj bi preprečilo dodajanje tretjega elementa, npr. kositra (White, 1889: 418), ki se pojavi tudi v zlitini pločevine z razbitine EŠD 29403. Glede na nižji delež cinka ter vsebnost železa, kositra in svinca ta pripada novi generaciji medeninastih zlitin, ki so bile uvedene v petdesetih in šestdesetih letih 19. stoletja pod nazivi *Aich's Metal* (patentirana 1860; Cu – 60,66 %, Zn – 36,58 %, Sn – 1,02 %, Fe – 0,4 do 3 %), *sterro-metal* (Cu – 60 %, Zn – 38 do 38,5 %, Fe – 1,5 do 2 %) ali *Gedge's alloy* (Cu – 60 %, Zn – 38,2 %, Fe – 1,8 %) in skupnim nazivom kovna medenina. Dodatek železa je zlitinam povečal trdnost in olajšal obdelavo, vendar na račun prožnosti in odpornosti (Brant, 1908: 155–159). V drugi polovici 19. stoletja je v britanski Kraljevi mornarici Muntzevo zlitino nadomestila t. i. ladijska medenina (*Naval Brass*) z 62 % bakra, 37 % cinka in 1 % kositra, iz katere so izdelovali spoje in zaščitno opločje (White, 1889: 418). Redukcijo teže opločja, ki se je še vedno pretežno izdelovalo v standardnih dimenzijah 48 x 14 palcev (121,9 x 35,6 cm), in s tem večjo hitrost ladij je prinesla že uporaba Muntzeve zlitine, na začetku 20. stoletja pa so na zadnjih lesenih jadrnicah uporabljali tanko valjano medeninasto pločevino s težo samo 3,75 kg/m² (Bingemann idr., 2000: 220; Bingemann, 2018).

S seznamov ladij dolge plovbe in večje kabotaže, zgrajenih v severnojadranskih ladjedelnicah tedanje Avstrije (mdr. Benetke, Trst, Reka, Koper, Rovinj, Martinščica, Mali Lošinj, Milje), ki jih je objavljala *Annuario Marittimo*, je razvidno, da je bil že v štiridesetih letih 19. stoletja pomemben del kliperjev–barkov, brigov in brigškunerjev, logerjev, brigantin ter največjih nav spojen in opločen z bakrom (it. fitto e foderato in rame), pri čemer sezname ne ločujejo barkra in bakrovih zlitin (glej AM, III, 1853: 115–175; AM, IV, 1854: 82–171). Nasprotno se leta 1891 v Pomorskem letopisu Ogrske kraljevske pomorske uprave na Reki med množico ladij dolge plovbe z oznako *ffr* pojavita barka z oznako *fdm* – *foderato in metallo giallo*, tj. medenino. Gre za bark Trojednica, izdelan leta 1873 v Kraljevici (Portorè), in bark Urinj, izdelan leta 1864 v ladjedelnici Varazze pri Genovi (Barbalić, Marendić, 2004: 191).

Kolut škripca

Lesen kolut škripca – bloka, najden nekaj metrov od osrednjega dela razbitine, je nepravilne okrogle oblike z dimenzijami 20 x 22,5 cm in debelino 2,5–2,7 cm (sliki 19 in 20). Po obodu poteka plitev utor za vrv. Kolut je bil v blok verjetno vpet z nepremično kovinsko osjo, ki v odprtino (Ø 4,5 cm) koluta ni nalegala neposredno, temveč skozi delno ohranjen ležaj, ki je preprečeval izjedanje koluta. Tečaj se na eni strani razširi v trikotno ploščo z ravno odrezanimi vogali, na drugi pa se valjasta puša konča z ravnim ustjem. Ležaj, izdelan iz še ne natančno opredeljenega grafitnega materiala, je bil na kolut pritrjen s tremi železnimi žebli. Analiza vrste lesa koluta, opravljena na Oddelku za lesarstvo Biotehniške fakultete, je potrdila domnevo, da gre za les gvajaka (*Guaiacum* spp), znanega tudi pod imenom Lignum Vitae. Rod *Guaiacum* sodi v družino *Zygophyllaceae* – jarmolistovke, komercialni vrsti gvajaka sta *Guaiacum officinale* in *G. sanctum*, ki pa se anatomsko ne razlikujeta. Podrobna analiza lesa kolesa je razkrila osnovne anatomске značilnosti gvajaka (Wheeler, 2011; Richter, Dallwitz, 2002). Pore gvajaka so razporejene difuzno, so izključno posamezne s srednjim tangencialnim premerom okoli 100 µm, v črnjavi so v njih pogosto prisotni depoziti. Traheje so ovalne in debelostene, imajo enostavne perforacije, intervaskularne piknje v stenah pa so izmenične. Osnovno tkivo predstavljajo libriformska vlakna in vlaknaste traheide, ki imajo zelo debele stene. Aksialni parenhim je pretežno apotrahealen difuzen ali difuzen v agregatih, lahko tudi pretežno paratrahealen, pičel, vazicentričen ali krilast (slika 21 a). Trakovno tkivo je homogeno, tj. izključno iz ležečih parenhimskih celic (slika 21 b). Trakovi so izključno enoredni in razporejeni v etažah (slika 21 c). Gvajak, zimzeleno drevesno vrsto, značilno za otoke Zahodne Indije, sicer pa razširjeno med južnimi obalami ZDA in severnimi deli Južne Amerike, označuje izjemno kompakten in trd les, katerega odpornost je bila kot nalašč za izdelavo obremenjenih delov pripon ali nateg. Zaradi izredno velike gostote (osnovna gostota med 950 in 1300 kg/m³), dobre

tlačne trdnosti, homogenosti, visoke vsebnosti smole v črnjavi, samomaznosti in hidrofobnosti se je gvajak uporabljal za izdelavo škripčevij, kolotov, vodil za vrvi, za samomazne puše za ladijske gredi, kot nadomestek za medenino in sivo litino v ležajih (npr. Record, Hess, 1949), za železniške pragove, za najrazličnejše stružene izdelke, kot so umetniški izdelki, ročaji za orodja, krogle za bowling, za zobata kolesa in celo za dele ur (Orwa idr., 2009; Torelli, 2006).

Glede na dimenzije naše najdbe gre najverjetneje za del škripca – bloka, vodila za pripono ali natega nepremičnega vrvja snasti (glej Mardešič, 1944: 162–164, 175–252). Obravnavani kos z značilno trikotno oblikovano ploščo tečaja v veliki meri ustreza opisu in upodobitvam v britanskih ladjedelniških priročnikih in enciklopedijah (npr. Steel, 1794: 154–155; Blocks – pl. 1; Rhind, 1841: 450; glej Clark, 1976, 138, 141–142, slika 2), kjer so omenjeni okovi odprtine običajno izdelani iz navadne medenine, ter ima tudi dobre primerjave v najdbah iz razbitin in še funkcionalnih delih ladijske opreme iz 18. in 19. stoletja med Severno Ameriko in Tasmanijo (npr. brig *Belinda*, zgrajen v Yarmouthu in potopljen leta 1824 v Goose Island bayu v Zahodni Avstraliji; kitolovec *Charles W. Morgan*, splavljen leta 1841 v New Bedfordu v Massachusettsu), kjer velja uporaba lesa gvajaka le za enega od številnih pokazateljev globalne čezatlantske ekonomije. Na razbitini ladje *Sydney Cove* (zgrajene v Kalkuti pod originalnim imenom Begum Shaw in preimenovane leta 1796 po njeni načrtovani destinaciji), ki se je leta 1797 potopila pri *Preservation Island*-u med jugovzhodno obalo Avstralije in Tasmanijo, je bilo najdeno več kot 60 kolotov škripčevja in snasta premera 9 do 22 cm, vseh izdelanih iz lesa gvajaka, ki je bil uvožen kot surovina in obdelan v Bengaliji (Nash, 2009: 129–130). Obseg produkcije za kraljevo in trgovsko mornarico v Britaniji, kot je za 18. in 19. stoletje izpričan za ladjedelniške komplekse v Portsmouthu in Southamptonu, ponazarja podatek, da je bilo za vrvje snasti in premikanje topov na ladji tretjega razreda (s 74 topovi) potrebnih 1400 različnih blokov in škripcev (Clark, 1976: 137).

Množica kolotov škripcev (it. pullegia di bozzello), med njimi več primerkov, podobnih najdbi z območja razbitine EŠD 29403, je bila odkrita tudi med ostanki francosko–italijanskega briga Mercure, katerega razbitine ležijo na morskem dnu 7 navtičnih milj (11 km) južno od Lignana v globini 17–19 m. Mercure je bil potopljen v bitki med ladjami angleške in napoleonske flote v noči med 21. in 22. februarjem 1812, ki je v pojasnilih k vedutam, naslikanih v desetletjih po spopadu, potekala »10 milj v smeri lebiča od obale Istre pred Piranom«; spopad je dobil ime bitka pred Piranom (Žitko, 1999: 24–27; glej Montani, 1963; Prikril, 1980: 243–244; Grioni 1988; Safonov, 1988: 181–182), del italijanske literature pa ga navaja kot bitko pri Gradežu (battaglia di Grado). Mercure je bil del družine 50 brigov z zelo podobnimi značilnostmi, ki jih je izdelala francoska Republika med letoma 1800 in 1813 (Beltrame, Gaddi, 2002; Beltrame, 2009, 2014). Gre za vojne brige, hitrejš

in opremljene s širšimi jadrni kot pri trgovskih sorodnikih. Njihova dolžina je znašala okoli 32 m, bočna širina 9 m, izpodriv pa 400/450 ton (Boudriot, Berti, 1981). Na Mercuru je bilo odkritih okoli 50 kolotov škripcev, ki so večinoma izdelani iz lesa gvajaka. Njihovi premeri segajo od 6 do 25 cm, debeline pa od 1,8 do 4 cm. Med koluti je precej takih, ki so opremljeni s tečaji (it. boccola) iz navadne medenine (»ot-tone«), od katerih jih ima kar 18 trikotna krila z luknjami za žeblje (Beltrame, Fadda, 2014: 94–96, slika 2).

Material, iz katerega je bil izdelan ležaj obravnavanega koluta iz bližine razbitine EŠD 29403 (slika 19), je glede na rezultate mineraloške analize (XRD) z metodo rentgenske praškovne difrakcije opredeljen kot grafit (C) s sledovi wustita (FeO). Z metodo prilaganja uklonov difraktograma strukturi grafita in wustita smo s pomočjo eksternega standarda NIST–676a določili tudi amorfnu fazo vzorca (slika 22). Zrnavost notranje strukture grafita (slika 23) in potencialni sledovi drugega materiala na površini v tej fazi raziskav ne omogočajo določitve, za katero zvrst grafitnega materiala natančno gre. Omenjena struktura bi lahko ustrezala umetnemu grafitu, ki se je v procesu flokulacije izkosmilil iz koloidnega stanja. Ta material je bil stranski produkt serije poskusov ameriškega kemika Edwarda G. Achesona (1856–1931), ki so sledili njegovemu patentu za izdelavo sintetičnega grafita leta 1896 (Acheson, 1907: 33). Kljub temu je vsaj enako verjetno, da je bil ležaj izdelan iz naravnega grafita, katerega uporaba za različne namene se je razmahnila z izkoriščanjem ležišč v Avstriji, Nemčiji in Združenih državah Amerike v sredini 19. stoletja. Ležaj je bil najverjetneje izdelan s prešanjem v kalup.

Historična literatura navaja, da so bili za rabo v gibljivih škripcih bolj kot vložki iz grafitnih materialov primerne ležaji iz trdega javorja ali t. i. ironwooda (*Olneya tesota*), temeljito impregnirani z grafitom in drugim mazivom, pri katerih je les ob rahlem zvišanju temperature zaradi trenja izločal del maziva. Druga vrsta samomaznih ležajev in puš je bila izdelana iz t. i. grafitnih zlitin, tj. kompozitnih materialov, narejenih iz deflokuliranega grafita (*deflocculated graphite*), ki so ga najprej dali v vakuum, da bi iz njega odstranili zrak, nato pa so ga pod zelo visokim tlakom uvaljali v staljeno belo kovino ali t. i. kovino Babbit (*Babbit metal*) (glej Dowd, 1930: 28, 154). Ležaji in puše iz grafitnih zlitin (glej Bearings, 1921: 19–21) so bili zaradi samomaznosti in odpornosti posebej primerni za rabo v pomorstvu, čeprav neposredne primerjave za tovrstno rabo grafita v škripčevju lesenih jadrnic avtorju tega dela prispevka niso znane. Veda o ladjah predmodernega obdobja je kot material za tečaje lesenih kolotov, praviloma izdelanih iz brestovine ali gvajakovine, preferirala kovino, in sicer jeklo ali »fosforjev bron« (Milošević, 1955: 145). Ta zlitina ima dobre drsne in mehanske lastnosti in je odporna proti morski vodi.

V okviru obravnavane kombinacije materialov za kolut – če ta dejansko sodi med ostanke razbitine 29403 – bi lahko izbira lesa gvajaka, sicer globalno priljubljene surovine za izdelavo obremenjenih delov snasti, ki so ga za iste na-

mene uporabljali tudi v ladjedelnicah na severni in vzhodni obali Jadrana (glej Milošević, 1955: 145; Radimir, 1959: 185), nakazovala izvor v enem od ladjedelniških središč v Angliji ali Severni Ameriki, v prid tezi, da je bila ladja, v celoti oziroma vsaj del njene opreme, morda izdelana na vzhodni obali ZDA, pa govori tudi ležaj iz grafita.

Biološka karakterizacija najdišča

Transekt z dolžino 50 m je prečil celotno območje anomalije EŠD 29403, in sicer nekoliko od podolžne osi razbitine v smeri JZ–SV (slika 24). Površino dna sestavlja pretežno peščena komponenta, mulja pa v vrhnjem sloju skorajda ni. Večino transektja predstavljajo skupki in večje strnjene zaplate spužev (sliki 25 in 26). Glede na razporeditev lahko govorimo o dveh ločenih območjih, med katerima je tudi del transektja (med 19. in 26. metrom), kjer spužve niso bile opažene. Na začetku transektja, do razdalje 1,5 m, se še pojavlja golo peščeno dno, nato pa se začnejo pojavljati skupki spužev. Na 5,8 m se na levi (severni) strani transektja na dnu pojavi les, ki je črn in praviloma neobraščen ali zelo slabo obraščen s posameznimi skorjastimi spužvami, na njem pa se pojavlja dolgoklešči morski pajek (*Inachus* sp.) (slika 27). Na desni strani transektja je železna veriga, ki je za razliko od lesa močno obraščena s spužvami. Pri 7,5 m verige na transektu ni več, dno je bolj peščeno, brez večjih vidnih trdnih elementov, še vedno pa se pojavljajo skupki spužev, pa tudi večja strnjena območja spužev. Med 13,5 in 27,7 m je spužev bolj malo, ker so na dnu predvsem leseni ostanki ali pa pesek brez večjih trdnih elementov, med 19 in 24 m pa jih sploh ni. Na lesu se pojavljajo dolgoklešči morski pajki (*Inachus* sp.), v lesu pa je, na podlagi apnenčastih oblog rovov, zaznavna prisotnost morskega svedrca (*Teredo navalis*). Med 32,5 in 35,5 m se pojavljajo večja struktuirana območja trdega dna, pod katerimi so luknje z jastogi (*H. gammarus*). Obrast s spužvami je zelo izrazita, med njo pa se pojavljajo škarpene (*Scorpaena* spp.). Veliko je tudi školjk *Chlamys varia*. Med 35,5 in 38 m se število in površina vidnih trdnih ladijskih ostankov na površini zmanjšuje in s tem tudi zaplate spužev. Med 38 in 48 m se pojavljajo večji skupki spužev, nato pa do konca transektja prevladuje peščeno dno z zaplatami grobega organskega detrita in bodičastimi kačjerepi (*O. quinque maculatus*), koraligenimi algami ter posamezne spužve.

Seznam vseh opaženih in določenih taksonov je izpisan v tabeli 2. Po številu taksonov in po biomasi prevladujejo spužve, ki so glavni biogeni strukturni element. Območje s koraligenom je precej večje in predstavlja približno 60 % območja vzdolž transektja. Visoka pojavnost spužev in koraligena je očitno povezana z območjem trdnega dna, ki se je razvilo na razbitini ladje, vendar pa, kot kaže, ne z njenimi lesenimi ostanki, ki so praviloma zelo slabo obraščeni.

| | Širši takson | Ožji takson |
|----|-------------------|-----------------------------------|
| 1 | spužva | <i>Suberites domuncula</i> |
| 2 | spužva | <i>Clathria compressa</i> |
| 3 | spužva | <i>Haliclona mamillata</i> |
| 4 | spužva | <i>Haliclona sp.</i> |
| 5 | spužva | <i>Dysidea avara</i> |
| 6 | spužva | <i>Axinella damicornis</i> |
| 7 | spužva | <i>Aplysina cavernicola</i> |
| 8 | spužva | <i>Crambe crambe</i> |
| 9 | spužva | <i>Crella sp.</i> |
| 10 | spužva | <i>Geodia cydonium</i> |
| 11 | spužva | <i>Cliona viridis</i> |
| 12 | spužva | <i>Cliona celata</i> |
| 13 | spužva | <i>Tedania anhelans</i> |
| 14 | spužva | <i>Antho incostans</i> |
| 15 | spužva | <i>Ircinia sp.</i> |
| 16 | spužva | <i>Tethya aurantium</i> |
| 17 | spužva | <i>Tethya citrina</i> |
| 18 | spužva | <i>Ulosa stuposa</i> |
| 19 | spužva | <i>Petrosia filiformis</i> |
| 20 | spužva | <i>Spirastrella cunctatrix</i> |
| 21 | ožigalkar | <i>Cereus pedunculatus</i> |
| 22 | ožigalkar | <i>Hydrozoa</i> |
| 23 | školjka | <i>Chlamys varia</i> |
| 24 | školjka | <i>Teredo navalis</i> |
| 25 | polž | <i>Jorunna tomentosa</i> |
| 26 | glavonožec | <i>Loligo vulgaris</i> |
| 27 | mногоščetinec | <i>Serpulidae</i> |
| 28 | rakovica | <i>Inachus sp.</i> |
| 29 | rakovica | <i>Medoripe lanata</i> |
| 30 | rakovica | <i>Maja squinado</i> |
| 31 | rak deseteronožec | <i>Homarus gammarus</i> |
| 32 | iglokožec | <i>Ophiotrix quinque maculata</i> |
| 33 | iglokožec | <i>Holothuria sp.</i> |
| 34 | plaščar | <i>Diplosoma spongiforme</i> |
| 35 | plaščar | <i>Didemnum sp.</i> |
| 36 | plaščar | <i>Ascidia mentula</i> |
| 37 | plaščar | <i>Asciidiella adpersa</i> |
| 38 | plaščar | <i>Phalusia mamillata</i> |
| 39 | riba | <i>Seranus hepatus</i> |
| 40 | riba | <i>Trachinus draco</i> |
| 41 | riba | <i>Gobius cruentatus</i> |
| 42 | riba | <i>Scorpaena spp.</i> |
| 43 | riba | <i>Conger Conger</i> |
| 44 | riba | <i>Heterostomata</i> |
| 45 | koraligene alge | |

Tabela 2: Taksoni, prepoznani na transektu območja EŠD 29304

Sklep

Izvedena identifikacija in dokumentiranje ter ocena ogo-
ženosti arheološko in kulturno-zgodovinsko zanimivih
ostalin na morskem dnu pred Piranom predstavljajo po-
memben korak v razvoju medinstitucionalnega sodelova-
nja na področju raziskav ter varstva naravne in kulturne
dediščine v teritorialnem morju Republike Slovenije, ki bi
lahko pomenil začetek tesnejšega povezovanja znanstve-
nih disciplin in nadgradnje sektorskih politik pri upravlja-
nju in načrtovanju rabe morskega prostora.

V okviru arheoloških rezultatov akcije v letu 2018 izstopa
identifikacija z batigrafsko izmero ugotovljene anomalije
EŠD 29403 kot razbitine večjega plovila, ki ga je mogoče na
podlagi dokumentiranih dimenzij in konstrukcijskih zna-
čilnosti ogrodja in oplate, radiometrične datacije in uporabe
pločevine iz kovne medenine, s katero je bila obita zunanost
korita, ter odsotnosti prepoznavnih najdb vojaškega značaja
z nekaj pridržka opredeliti kot razbitino med 24 in 36 metrov
dolge trgovske dvojbornice, ki je potonila v sredini ali v
drugi polovici 19. stoletja. Na ladjo dolge ali velike priobalne
plovbe (morda brig, brigškuner ali večji loger oziroma dvo-
jamborni škuner) s konca dobe lesenih jadrnic kažejo tudi
dimenzije zakovic za spajanje glavnih delov korita. Predla-
gani dataciji ustreza tudi kolut škripca pripone ali natege
snasti, izdelan iz lesa gvajaka (*Guaiacum* spp) in opremljen s
prešanim ležajem iz grafita, katerega uporaba se je razmah-
nila v sredini 19. stoletja. Kombinacija materialov, iz katerih
je bil narejen kolut, odkrit nekaj metrov od razbitine, bi lah-
ko nakazovala, da je bila ladja, v celoti oziroma vsaj del njene
opreme, morda izdelana v ladjedelniških središčih v Angliji
ali na vzhodni obali ZDA. Če bi se v nadaljnjih preiskavah
izkazalo, da je tečaj izdelan iz sintetičnega grafita, bi to za-
maknilo datacijo v čas po patentu iz leta 1896.

Stanje ohranjenega dela ladje EŠD 29403, ki očitno obsega
le najnižji, največ do 1 m visoko ohranjen del korita, se zdi
stabilno, vendar še naprej izpostavljeno poškodbam, ki jih
povzročajo pridnena ribolovna orodja. Pregled ostalih dveh
anomalij (EŠD 29401 in 29402) na površini dna ni prinesel
najdb, ki bi dopuščale sklepanje o obstoju pokopanih ladij-
skih razbitin, zato bodo za opredelitev značaja teh predelov
dvignjenega trdnega dna potrebne nadaljnje raziskave.

Nadaljnje raziskave v obliki sondiranj na izbranih mestih
korita EŠD 29403 bodo omogočile zanesljivejšo tipološko
opredelitev plovila ter, z nekaj sreče, tudi identifikacijo lad-
je in brodoloma v seznamih, ki so bili objavljeni v letopisih
avstrijskega Lloyda (*Lloyd Austriaco*) oziroma Cesarsko-kra-
ljeve pomorske vlade (*Governo Centrale Marittimo*) iz Trsta (glej
Državni arhiv v Trstu/Archivio di Stato di Trieste, fond 340,
fasc. 18/2 - *Sinistri marittimi*). Za eno od batigrafskih ano-
malij, zaznanih v sektorju severno od Savudrije, se morda
skrivajo ostanki ladje tipa »nava« z imenom Milka Dobrota,
ki je bila zgrajena leta 1864 na Otoku princa Edvarda (Ka-
nada), in je prej z imenom lastnika »L. C. Oven« plula pod
angleško zastavo. Milka Dobrota je decembra 1869 skupaj z

11-člansko posadko in opremo potonila »nelle vicinanze di
Salvore« (AM, XX, 1870: XXXIV, 82).

Vsa preiskana območja so zelo pomembna tudi z vidika
biodiverzitet in varstva narave. Posebej so zanimivi pre-
deli, kjer se pojavlja trden substrat in na njem tudi elementi
koraligena, v katerem po masi prevladujejo spužve; med
temi so tudi zaščitene vrste npr. *Tethya aurantium*, *T. citrina*,
Verongia cavernicola in spužva možganjača (*Geodia cydonium*).
Ta območja so zanimiv habitat za še eno zaščiteno vrsto, ja-
stoga (*H. gammarus*), pa tudi za komestibilne vrste rib, kot so
škarpene (*Scorpaena* spp.), morski listi in ugorji (*C. conger*).
Dobro poznavanje prisotnih vrst ima neposredno uporabno
vrednost tudi za identifikacijo arheoloških ostalin in načr-
tovanje ukrepov varstva. Kot se je izkazalo tudi med temi
raziskavami, prisotnost in strnjena razporeditev nekaterih
vrst ali pa skupin organizmov, kot so npr. obraščajoče spu-
žve, kažeta na prisotnost trdnega substrata in na potenci-
alno arheološko najdišče. Nekatero vrsto, kot so spužve vr-
tavke iz rodu *Cliona* ali morski svederc (*Teredo navalis*), lahko
pomenijo tudi grožnjo ostalinam, na drugi strani pa obrast
spužev površino artefaktov varuje pred abrazijo oziroma
površinskimi poškodbami.

Med raziskavami so bile izoblikovane smernice za moni-
toring in dopolnilne raziskave, katerih izvedba zaradi ča-
sovnih in finančnih omejitev v okviru akcije v letu 2018 ni
bila mogoča. Poleg primerno trdne namestitve izhodiščnih
in končnih točk stalnih transektov bi veljalo večjo pozor-
nost posvetiti tudi območjem večjih zaplat spužev in druge
epifavne ter mestom, kjer so arheološke ostaline vidne in
izpostavljene na površini. Na takih mestih bi bil za celo-
vitejši vpogled v dejansko pestrost združb potreben tudi
podrobnejši popis manjše in bolj skrite kriptobentoške fav-
ne v kvadrantih 1 x 1 m. Za potrebe fotogrametrije bi bilo
tam smiselno namestiti fiksne markerje, ki bi lahko služili
kot osnova za nadaljnje spremljanje. Na območjih, kjer epi-
bentoška združba nakazuje na trden substrat, pa ta ni jasno
izražen na površini oziroma je njegov izvor neznan, bi bilo
nujno vzorčiti dno tudi s korerji.

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Biotehniška fakulteta, Univerza v Ljubljani). Posebno za-
hvalo namenjamo Nadji Terčon in Urošu Hribarju (Pomor-

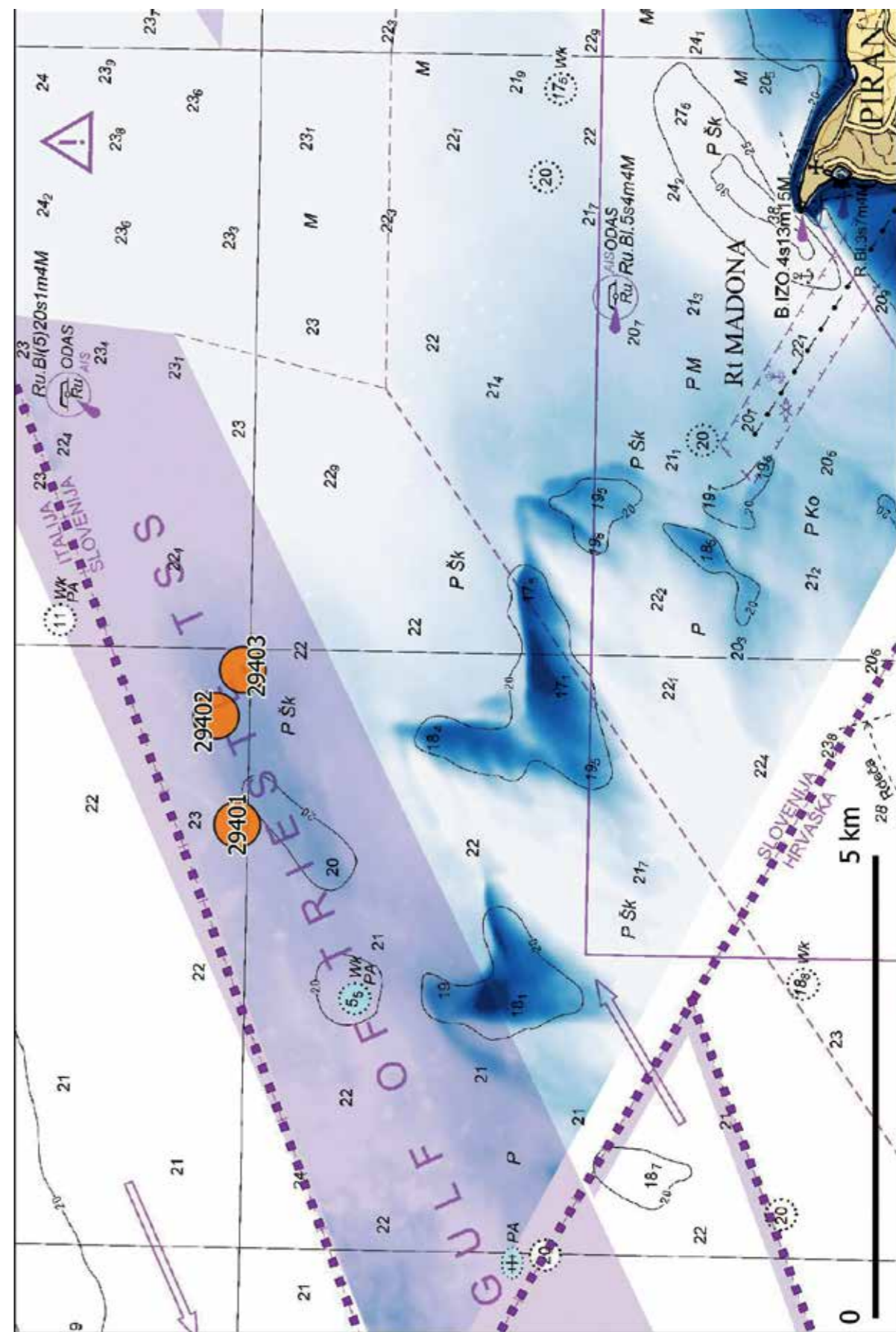
ski muzej »Sergej Mašera« Piran) za natančno branje in
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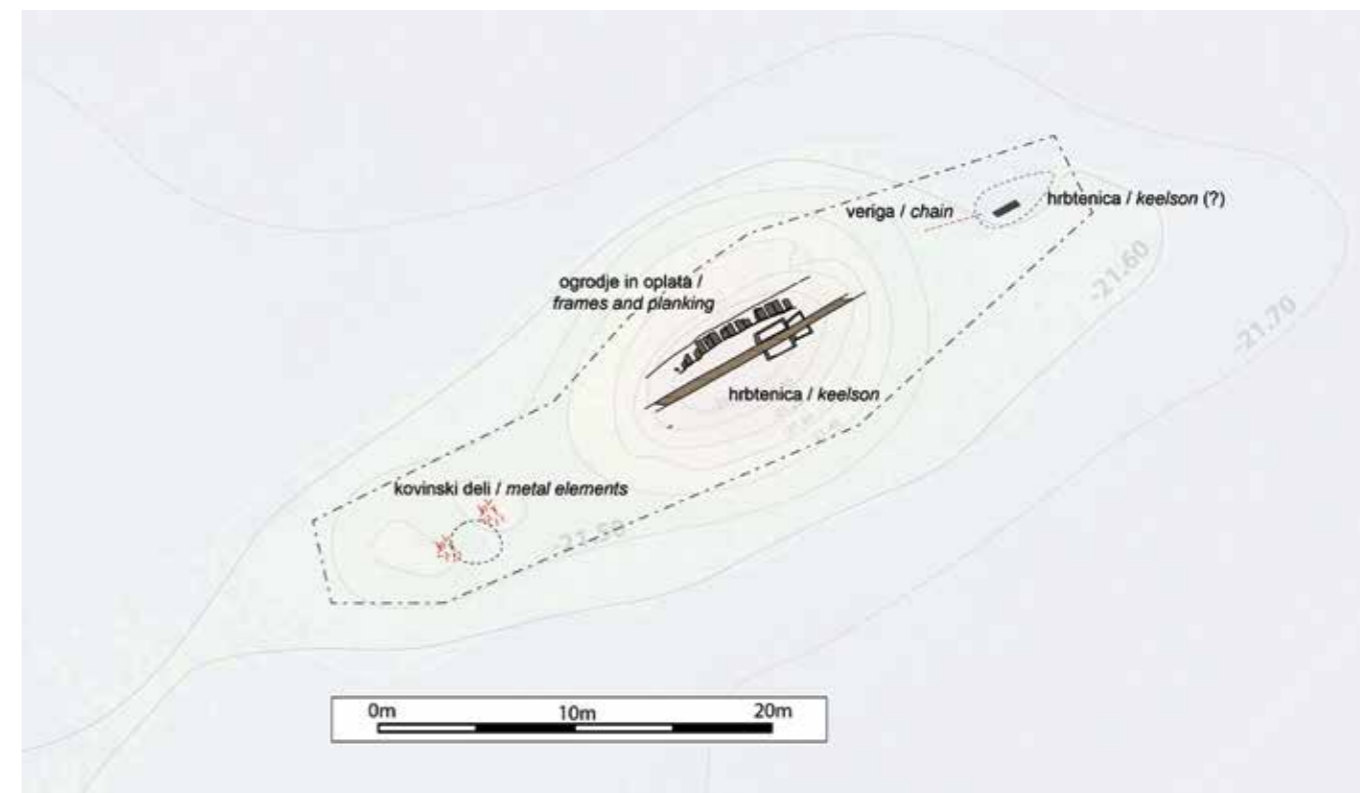
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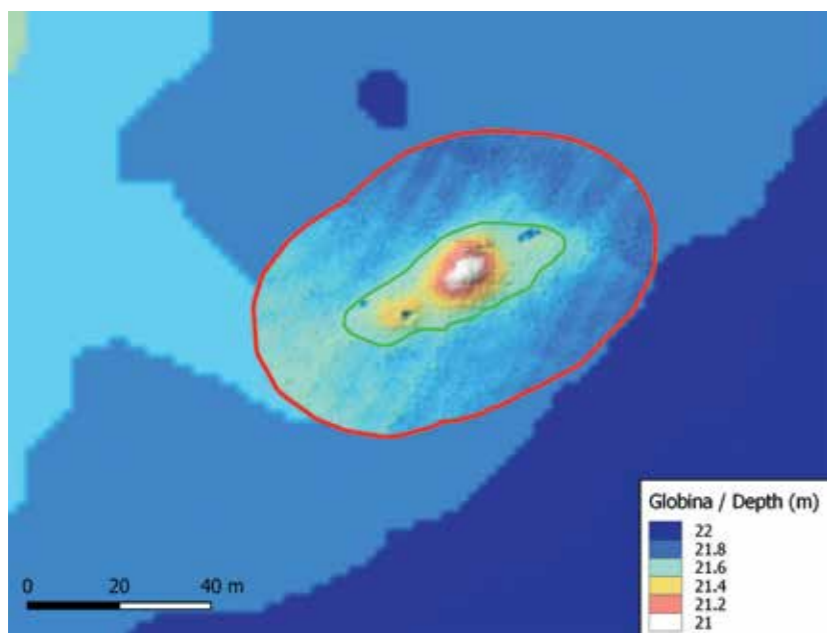
I. Pomorska karta z označenimi območji enot dediščine, kiso bile obravnavane avgusta 2018. Podlagi: pomorska karta Tržaški zaliv 03 (Ministrstvo za infrastrukturo Republike Slovenije) in groba batimetrija (osebni arhiv A. Žerjal) (izdelal: S. Poglajen)
 I. Nautical chart with the areas of the heritage units investigated in August 2018 marked on it. Based on: nautical chart Gulf of Trieste 03 (Ministry of Infrastructure of the Republic of Slovenia) and rough bathymetric map (personal archives of A. Žerjal) (prepared by: S. Poglajen)



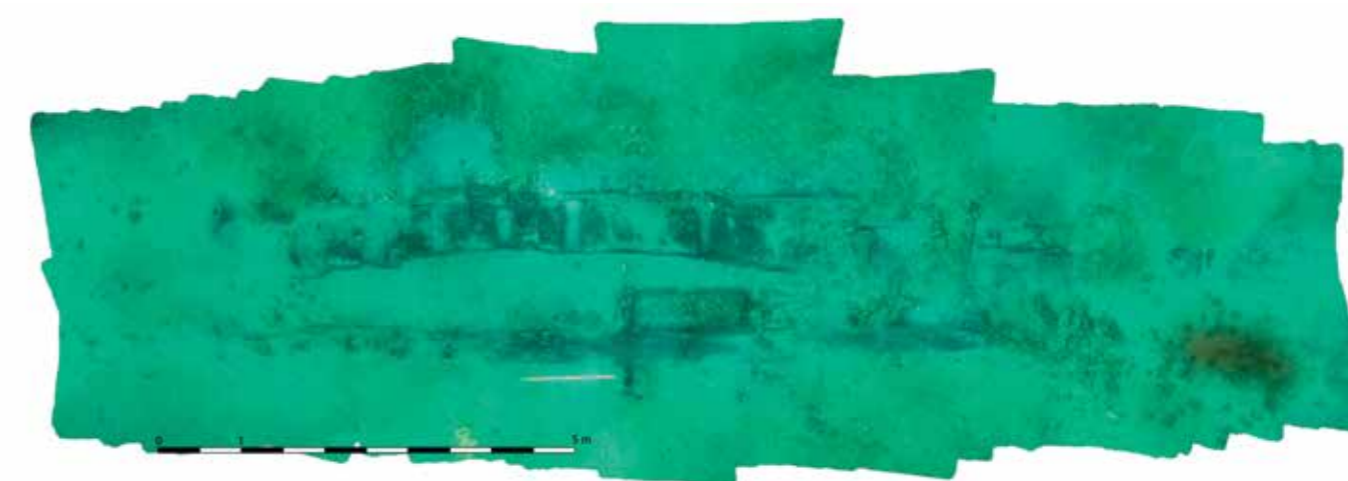
2. Aleš Tiran med opisovanjem delov ladijske konstrukcije (foto: David Badovinac)
 2. Aleš Tiran during the process of describing the parts of the vessel's structure (photo: David Badovinac)



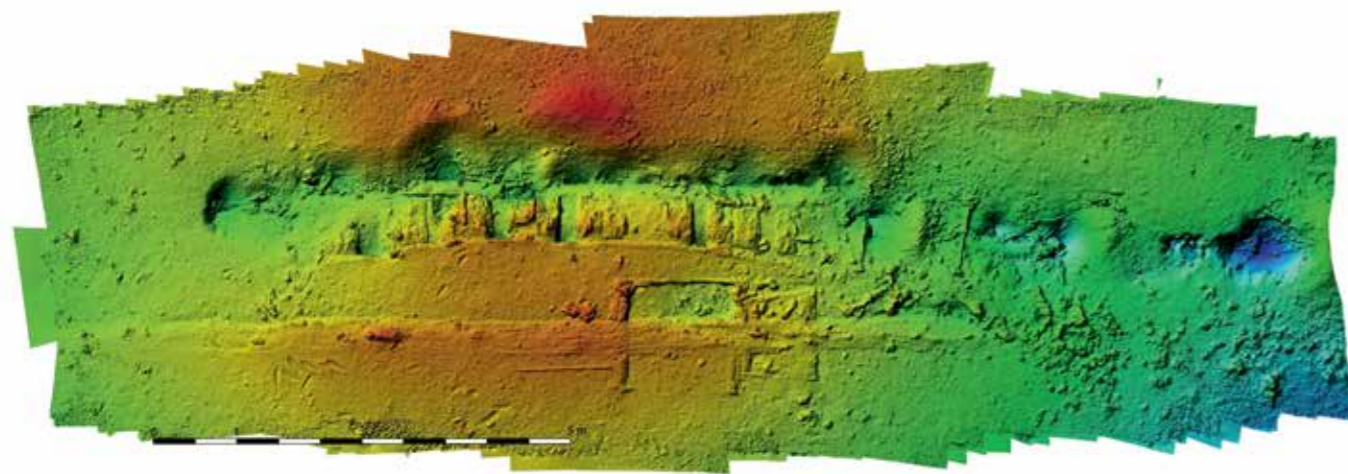
4. Izris ostankov razbitine (izvedba: David Badovinac)
 4. Diagram of the remains of the wreck (prepared by: David Badovinac)



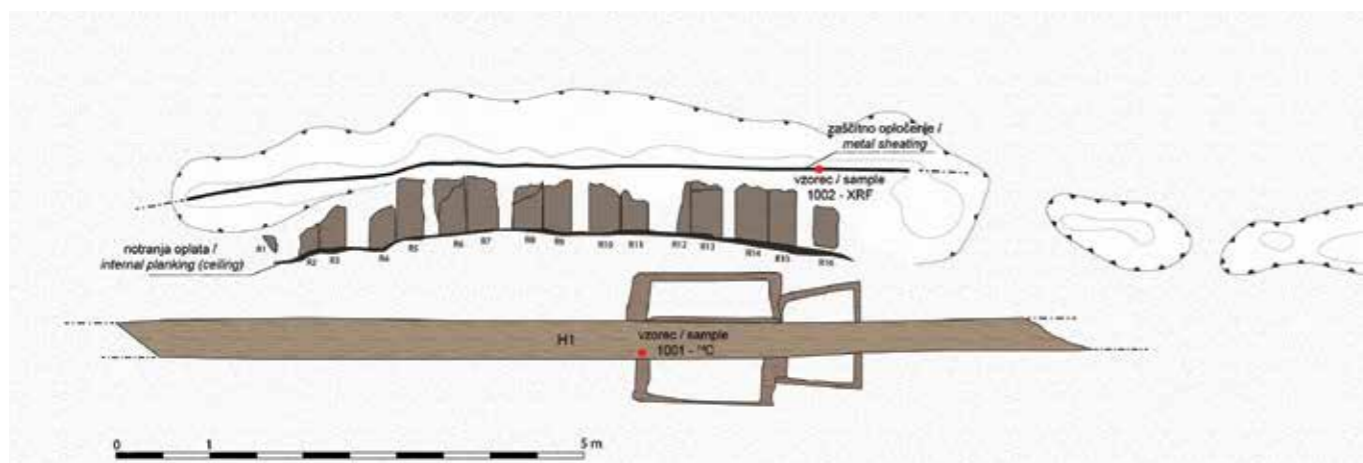
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 3. Bathymetric map of location EŠD 29403 and the surrounding area with the examined area and the exposed remains of the wreck drawn in (batimetric map: personal archives of A. Žerjal) (prepared by: S. Poglajen and D. Badovinac)



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6. Depth model of the central section of the exposed remains of the wreck (prepared by: David Badovinac)



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8. Detail of wooden element in the depression on the eastern side of the site (photo: Borut Mavrič)



9. Detajl zveržene kovine na zahodnem delu najdišča (foto: Borut Mavrič)
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10. Lesen kolut škipca *in situ* (foto: David Badovinac)
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12. Polno rebro s presledkom (room/full frame & space) (foto: David Badovinac)
12. Full frame and space ("room and space") (photo: David Badovinac)



11. Zaščitno opločje iz bakrove zlitine (foto: David Badovinac)
11. Protective sheathing made of copper alloy (photo: David Badovinac)



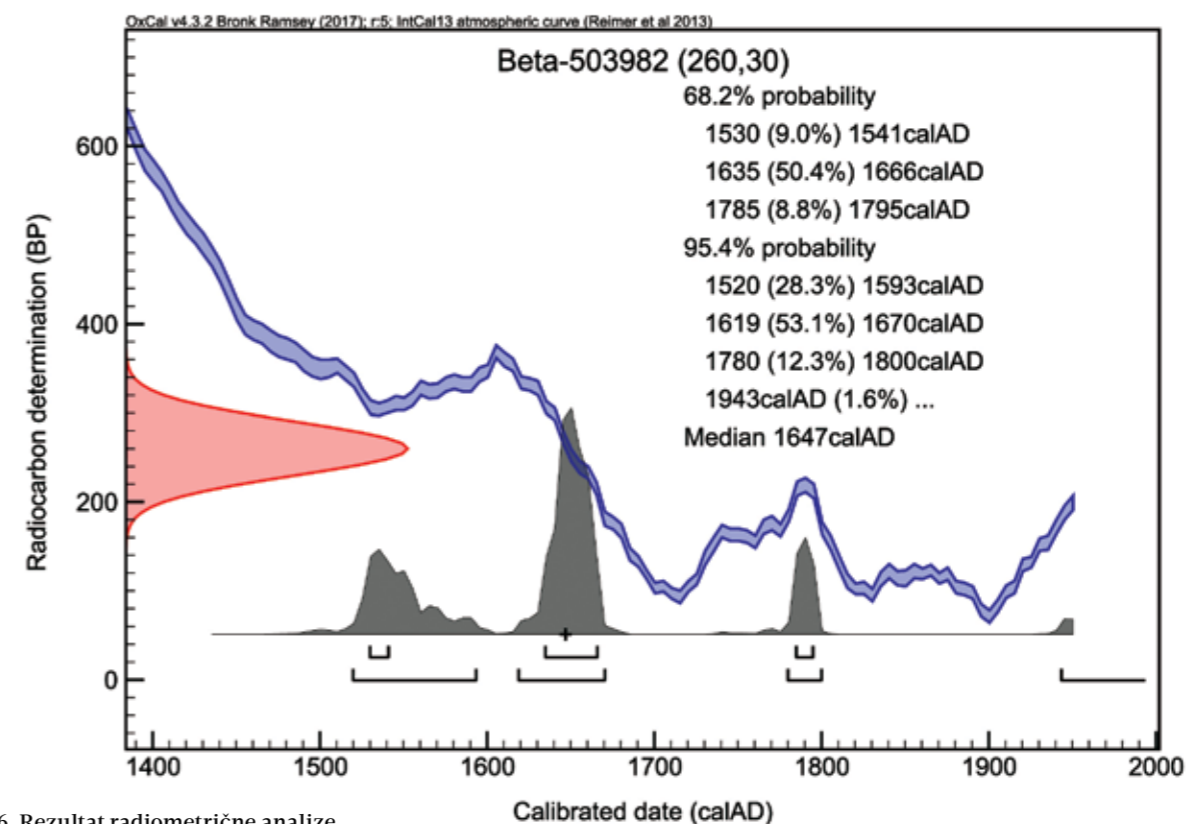
13. Zakovici (foto: David Badovinac)
13. Bolts (photo: David Badovinac)



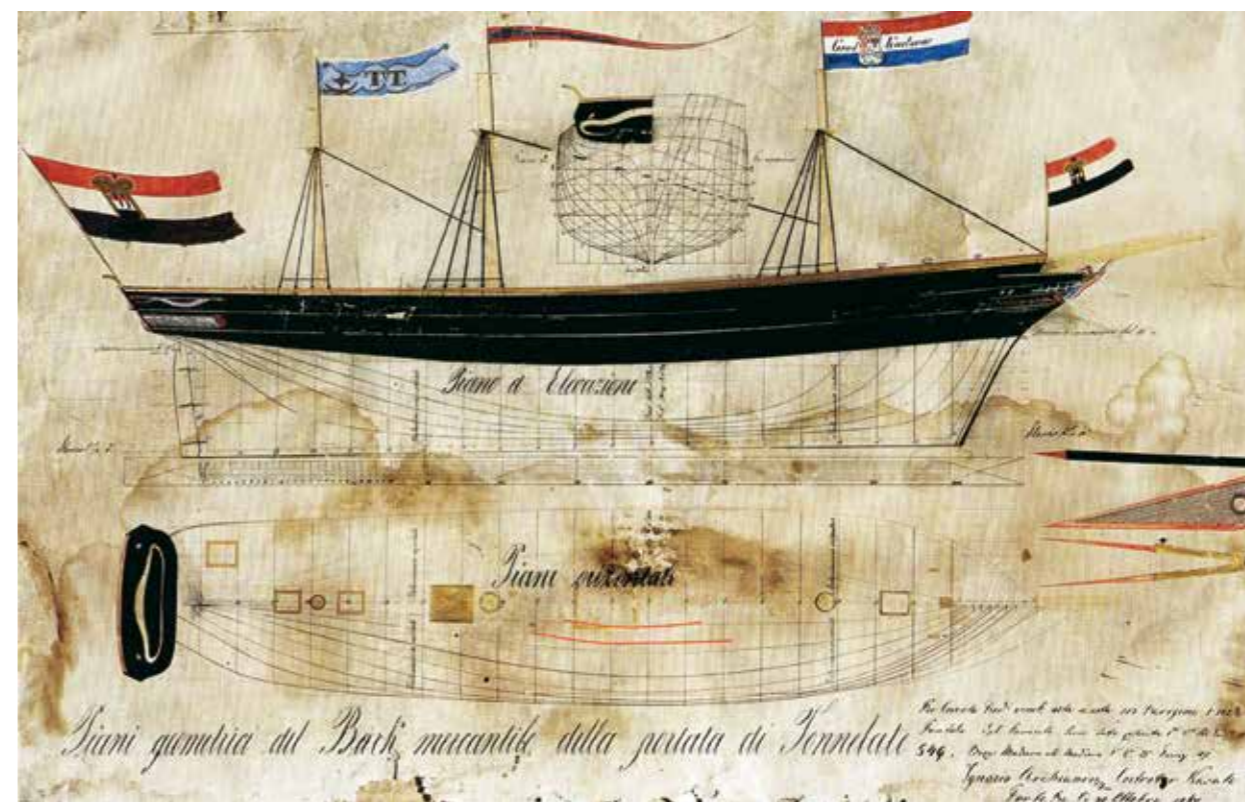
14. Hrbtenica in ogrodje z oplato (foto: David Badovinac)
14. Keelson and skeleton with planking (photo: David Badovinac)



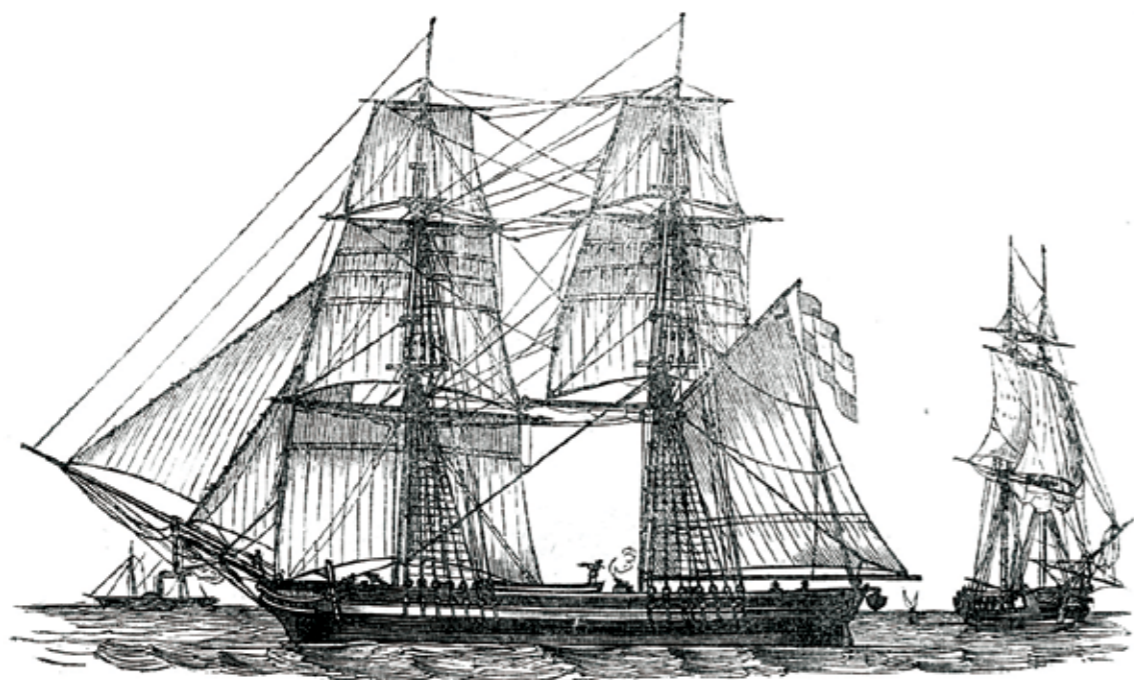
15. Osrednji del hrbtenice z leseno kašto (foto: David Badovinac)
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16. Rezultat radiometrične analize
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17. Načrt barka Grad Karlovac z linijami razbitine EŠD 29403 (po Mendeš, 2006: 107)
17. Plan of the barque Grad Karlovac with the lines of wreck EŠD 29403 (after Mendeš, 2006: 107)



Brick — Brigg — Brick — Brig.



Brick Seiner — Schunerbrigg — Brick goelette — Brigantine.

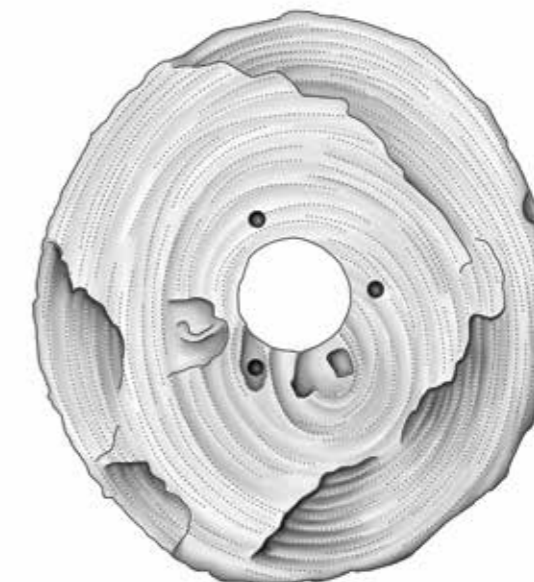
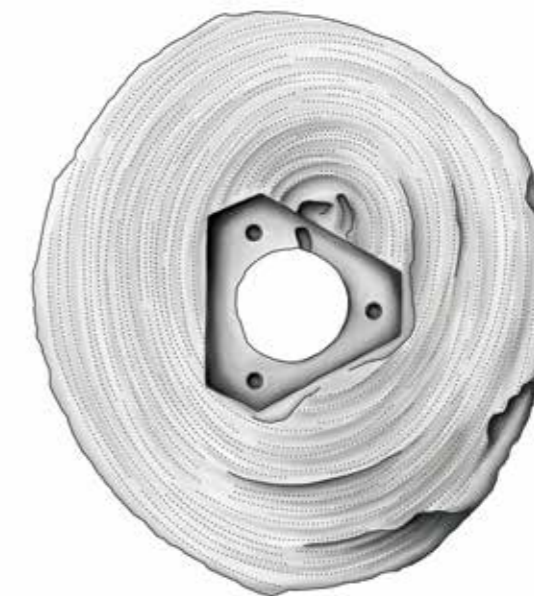
18. Brig in brigškuner (po AM, 1878, str. 204)

18. Brig and schooner brig ("brigantine" in modern American terminology) (after AM, 1878, page 204)



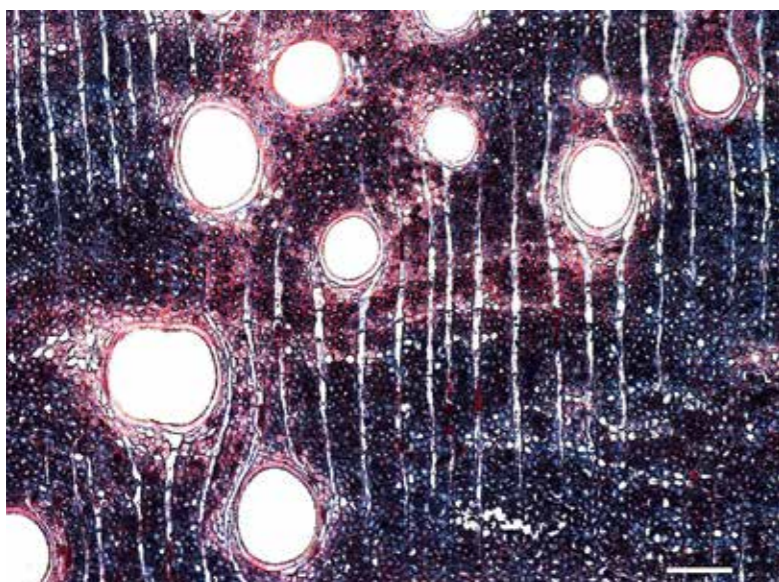
0 5 10 cm

19. Lesen kolut škripca z ležajem (foto: Andrej Gaspari)
19. Wooden block sheave with bearing (photo: Andrej Gaspari)

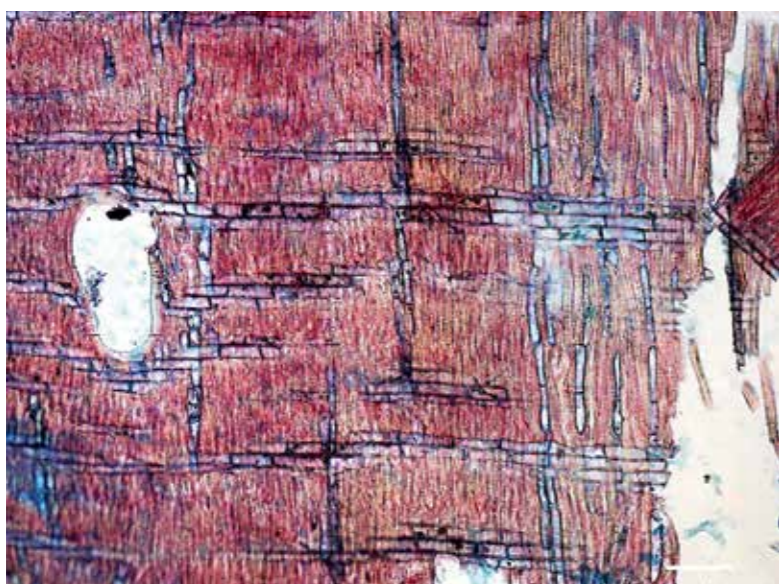


0 20 cm

20. Lesen kolut škripca (izdelala: Andrej Gaspari in Blaž Kumer)
20. Wooden block sheave (drawn by: Andrej Gaspari and Blaž Kumer)



a

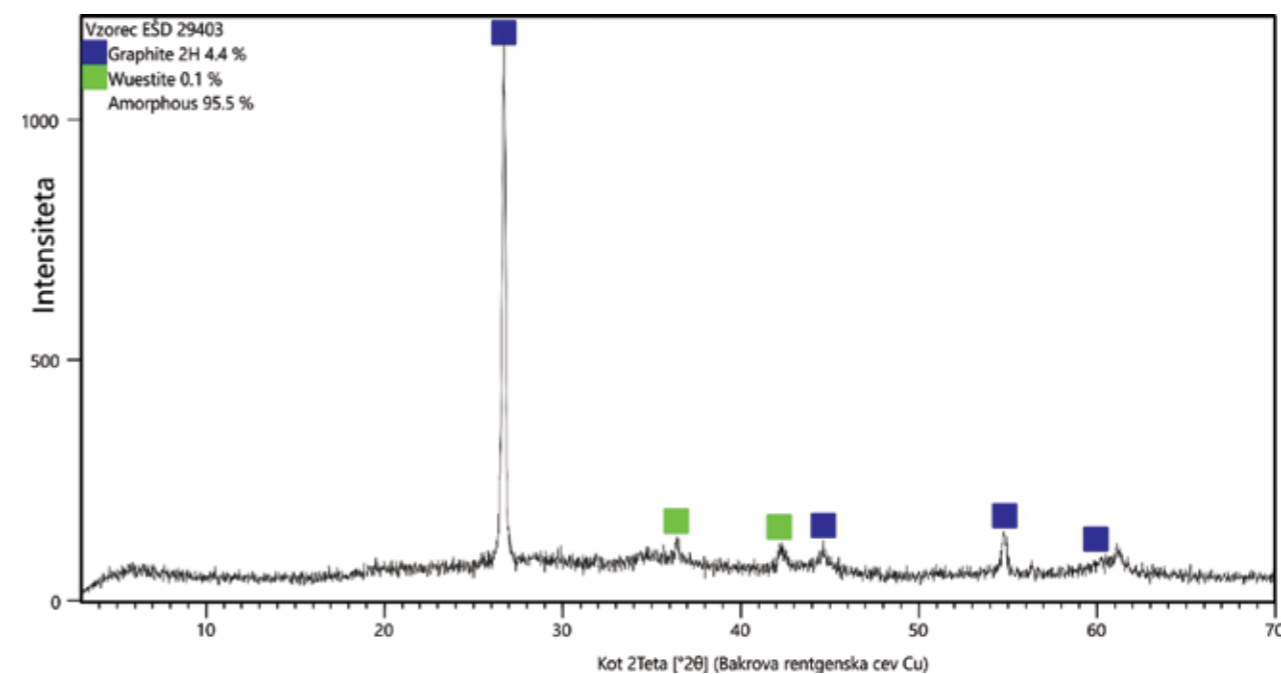


b

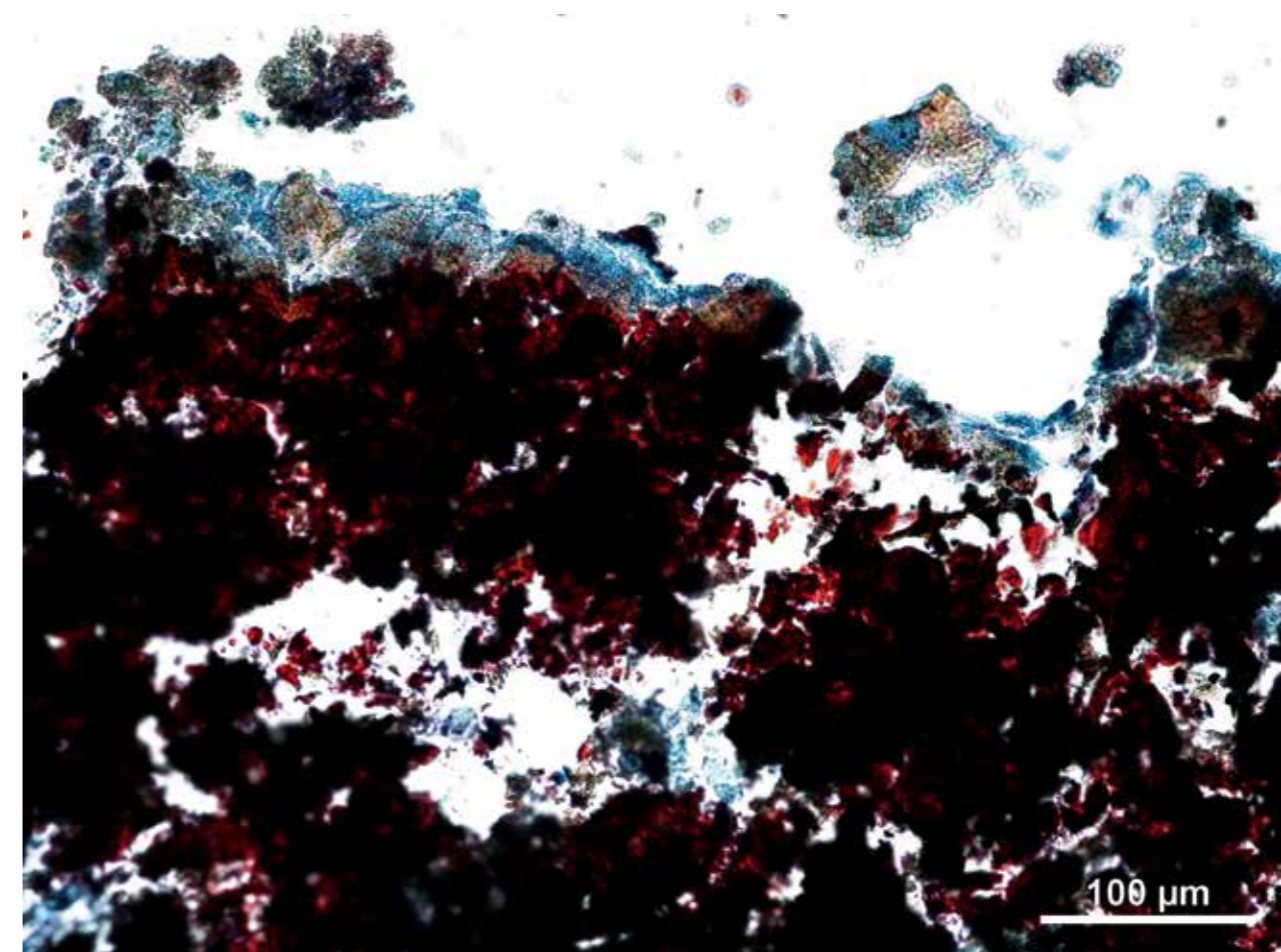


c

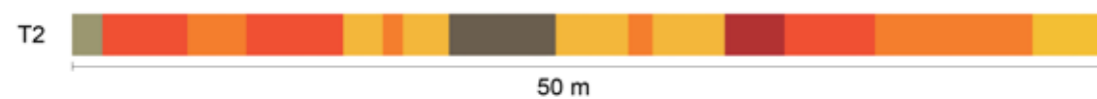
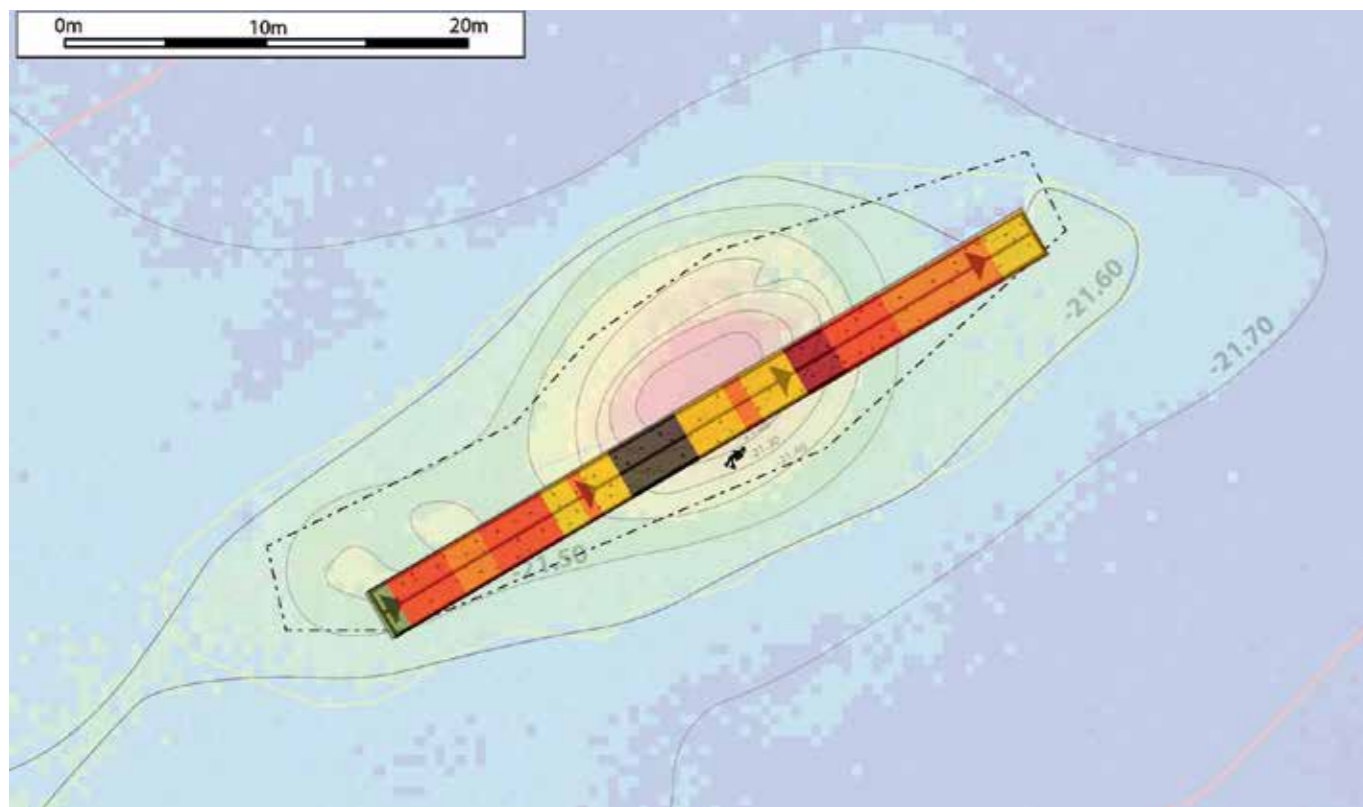
21. Kolut škripca, gvajak (*Guaiacum* spp.); a) prečni prerez, b) radialni prerez in c) tangencialni prerez. Merilna daljica 100 μ m (foto: Maks Merela)
 21. Block sheave, guaiacum wood (*Guaiacum* spp.); a) cross section, b) radial section, c) tangential section. Scale bar 100 μ m (photo: Maks Merela)



22. Ležaj koluta. Difraktogram z maksimumi uklonov mineralnih faz z deležem amorfne snovi (izdelal: Matej Dolenc)
 22. Sheave bearing. Maximum diffraction pattern of mineral phases with the amorphous phase content (prepared by: Matej Dolenc)



23. Ležaj koluta; prerez. Merilna daljica 100 μ m (foto: Maks Merela)
 23. Sheave bearing; cross section. Scale bar 100 μ m (photo: Maks Merela)



- peščeno dno / sandy bottom
- skupki organskega detrita (lupine školjk in polžev) / clusters of organic detritus (shells of bivalves and gastropods)
- skupki organskega detrita s kačjerepi *Optiothrix quinque maculata* / clusters of organic detritus with brittle stars (*Ophiothrix quinque maculata*)
- skupki organskega detrita s kačjerepi *Optiothrix quinque maculata* in posameznimi spužvami / clusters of organic detritus with brittle stars (*O. quinque maculata*) and individual sponges
- skupki polžev / clusters of gastropods
- strnjene zaplate spužev / concentrated patches of sponges
- močno obraščene trdne strukture / heavily overgrown solid structures

24. Izris kategorij videotransekta na batigrafskem načrtu najdišča (izvedba: Borut Mavrič in David Badovinac)
 24. Videotranssect categories shown on the bathymographic map of the site (prepared by: Borut Mavrič and David Badovinac)



25. Zaplata spužev (foto: Borut Mavrič)
 25. Patch of sponges (photo: Borut Mavrič)



26. Skupki spužev z bodičastimi kačjerepi *Ophiothrix quinque maculata* in tremi osebki polža zaškrgarja *Jorunna tomentosa* med parjenjem (foto: Borut Mavrič)
 26. Cluster of sponges with spiny brittle stars *Ophiothrix quinque maculata* and three specimens of the nudibranch sea slug *Jorunna tomentosa* during mating (photo: Borut Mavrič)



27. Na ostankih razbitine so se zadrževali številni primerki rako-vice *Inachus* sp., katerih oklep krasijo raznobarvne spužve (foto: Borut Mavrič).
 27. Numerous specimens of the spider crab *Inachus* sp., whose shells are adorned by colourful sponges, are found on the remains of the wreck (photo: Borut Mavrič)

Andrej Gaspari, David Badovinac, Borut Mavrič, Maks Merela, Matej Dolenc, Sašo Poglajen, Matej Draksler, Rene Masaryk

Documentation of archaeological sites in the open sea north-west of Piran in 2018 and initial findings regarding shipwreck EŠD* 29403

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Abstract

The article presents the main results of the identification and documentation of underwater archaeological sites in the open sea north-west of Piran, conducted by archaeologists from the Underwater Archaeology Institute in conjunction with experts from the National Institute of Biology's Marine Biology Station in Piran over two days in August 2018 under the aegis of the Institute for the Protection of Cultural Heritage of Slovenia. Notable among the archaeological results of the operation in 2018 is the identification via bathygraphic survey of the anomaly designated EŠD 29403 as the wreck of a large vessel which, on the basis of the documented dimensions and structural characteristics of the skeleton and planking, radiometric dating and the use of malleable brass sheathing on the outside of the hull, combined with the absence of identifiable finds of a military nature, may be defined as the wreck of a two-masted

merchant vessel between 24 and 36 m long, presumed to have sunk in the middle or second half of the nineteenth century. A further indication that this was a vessel built for seagoing or long-distance coastwise voyages (possibly a brig, a schooner brig or a large two-masted schooner) from the end of the age of wooden sailing ships is provided by the dimensions of the bolts used to fasten the main hull elements. The proposed dating is also supported by the sheave of a rigging block made of guaiacum wood (*Guaiacum* spp.) and fitted with a pressed graphite bearing, the use of which became widespread in the mid-nineteenth century. The combination of materials from which the sheave – discovered a few metres from the wreck – was made could indicate that the vessel, or at least part of its rigging, originated in the shipbuilding centres of England or on the eastern US seaboard.

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A visual examination of two other anomalies (EŠD 29401 and EŠD 29402) did not yield any finds suggesting the presence of buried shipwrecks, so further research will be necessary in order to define the character of these raised areas of seabed. All the examined areas are also important from the point of view of biodiversity and nature conservation, while enhanced knowledge of the species present has a direct applicable value for the identification of archaeological remains and the planning of conservation measures.

Introduction

Over the course of several meetings that took place between autumn 2016 and summer 2017, the informal working group for underwater cultural heritage at the Ministry of Culture's Cultural Heritage Directorate drafted up a strategic/programmatic document entitled "Design of a programme of integrated research and starting points for the preparation of a management plan for underwater cultural heritage in the Slovenian sea" (Gaspari et al., 2018). At the suggestion of Ministry of Culture advisers, an action plan of priority investigations (2018–2019) was annexed to the document, listing those investigations that would best be carried out by a group of experts under the aegis of the Institute for the Protection of Cultural Heritage of Slovenia (ZVKDS), given their starting points and objectives and taking into account historical precedent, where archaeological research of underwater areas of Slovenia has traditionally been coordinated by the monument protection service.

The action plan submitted proceeded from the unavoidable realisation that the available data on cultural heritage on the seabed in the Slovenian part of the Gulf of Trieste do not allow a comprehensive evaluation of the importance of and threats to registered underwater sites, since current knowledge of the greater part of the units in question is manifestly insufficient for this purpose. The determination of research priorities was therefore based on the urgent need for a concentration of data on the archaeological potential of anthropogenic and natural phenomena within spatially defined areas of the open sea.

As part of the coordination of tasks and optimisation of the use of resources allocated under the ZVKDS's programme of work and financial plan for 2018, three locations were selected for priority treatment from the first priority focus, namely reconnaissance and non-invasive investigation to determine the archaeological potential of anomalies north of Savudrija or north-west of Piran, which, on the basis of analysis of data from high-resolution bathymetry, have been identified as presumed locations of sunken vessels (Figure 1).

In keeping with the concept that treats archaeological remains as an integral part of the marine environment, experts from the Marine Biology Station in Piran were invited

to join the investigation. The greater part of the seabed off the coast of Slovenia, including the area of the target group of anomalies, consists of soft mobile sediment, and there is practically no solid substrate of natural origin. The bottom consists for the most part of silt or sandy silt, while the sand content and the organic component increase towards the west or south-west, where a biocoenosis of coastal detritic bottom also appears, the latter characterised by a rich epifauna (Lipej et al., 2018). Wrecks and other artefacts in such an environment greatly increase the habitat diversity. The resulting "islands" of solid bottom are colonised by numerous organisms that do not appear in the soft substrate, thus increasing the species diversity of the area. Such remains are important not only from the archaeological and cultural-historical points of view, but also in ecological terms. They represent hotspots of biodiversity (Leewis et al., 2000). Under the original plan, the interventions focused on the locations EŠD 29404, EŠD 29405 and EŠD 29406, which lie in the central area of the "sandbanks" NW of Piran. Later, however, because of potential complications relating to the route of the border determined by the arbitration proceedings, three other locations from the priority group were selected. These lie further north, in the area where the sandbanks transition towards the deeper part of the Gulf of Trieste. The locations are entered in the register of immovable cultural heritage under the following heritage record numbers (or EŠD numbers, to use the Slovene abbreviation): EŠD 29401 – Barka NW III; EŠD 29402 – Barka NW II; EŠD 29403 – Barka T NW I. This paper focuses on the last of these three locations. The complete report on the interventions carried out at all three locations is held in the archives of the contracting entity (Badovinac et al., 2018).

Fieldwork process and methodology

Fieldwork took place in accordance with a previously confirmed plan detailing the sequence of the following sets of procedures:

1. identification and structural inspection of the anomaly and documentation of the current state of remains/structures using high-resolution multi-image 3D photogrammetry;
2. sampling for the purposes of an assessment of the archaeological potential of the site (radiocarbon dating/dendrochronology; sampling of movable archaeological finds) and biological (benthic populations) and geological characterisation (characteristics of the seabed and dynamics of change) of the area of the anomaly;
3. definition of micro-reference areas for observation of overgrowth and changes in sedimentation/erosion and placing of markers for further monitoring;

4. extensive examination of the direct surrounding area of anomaly (approx. 100 x 100 m);

5. elaboration of a report with proposals for further research and protection measures.

The fieldwork was carried out by a team from the Underwater Archaeology Institute (David Badovinac, Matej Draksler, Rene Masaryk, Aleš Tiran and Rok Klasinc) in conjunction with experts from the Marine Biology Station (MBS) in Piran, part of the National Institute of Biology (Borut Mavrič, Tihomir Makovec and Matej Marinec). The Marine Biology Station took charge of all the diving logistics and facilitated the use of the research vessel *Sagitta*.

The fieldwork took place over two working days. Dives were made in location EŠD 29402 on 9 August 2018 and in locations EŠD 29401 and EŠD 29403 on 10 August 2018. A total of 16 single dives were made, i.e. eight dives with two divers each. Dives lasted for up to 35 minutes.

Dossiers containing bathymetric maps, information on the dimensions, shape and depth of the anomaly and the geographical coordinates of the centroid position were prepared in advance for all three locations. These coordinates were used as entry points for the individual locations, in other words as the starting points for examination of the areas in question, and were marked by dropping buoyed weights.

Before the dives, the areas in question were examined by lowering an IP camera. Additional preliminary information on the shape of the surface of the seabed was obtained using a Deeper Smart Sonar PRO+ wirelessly connected to a receiver unit.

An archaeological survey of the seabed was conducted using a circular clockwise search technique with the help of a tape measure attached to the weight of the marker buoy. The dives were recorded using a GoPro camera. In addition to manual measurements and descriptions, finds and the remains of structures were documented in detail using a Nikon d800 camera fitted with a dome lens to enable the creation of a photogrammetric model, which was then made using Agisoft PhotoScan software. Positioning of the model was done with the help of horizontally placed ranging rods with a measured bearing.

The archaeological survey also defined the directions of line transects, along which the MBS team members made video recordings for the purposes of biological characterisation of the location. This is an established method in marine biology that enables the definition of fauna, flora and habitat types within a given area in a rapid, effective and, above all, non-destructive manner (Lipej et al., 2003). In the line transect method, the underwater video camera operator films all the habitat types that succeed each other along a measuring tape placed at right angles to or parallel to an observed morphological feature (Lipej et al., 1999).

Location 29403

Working process

The starting point of the survey was placed 7.5 m SE of the central section of the anomaly. Visibility was around 8 m, so while descending to the location a dark patch was immediately visible towards the NW. This proved to be the wreck of a large wooden vessel in the central part of the area of the bathygraphic anomaly. After positioning markers for photogrammetry, measurements and documentation of the exposed parts of the vessel began. This was followed by an examination and description of the characteristics of an area 50 m in length and up to 10 m wide (Figure 2). As part of the defined objectives of the operation, a sample of the vessel was taken for radiometric analysis and determination of the type of wood, while a sample of sheet metal from the outer skin was taken for chemical analysis. The sheave of a block was also recovered from the location to facilitate typological-chronological definition. Once the investigations were complete, this was handed over to the Sergej Mašera Maritime Museum in Piran for permanent keeping. In the last of the total three dives in the location, the MBS team placed a transect line parallel to the axis of the vessel, i.e. the central longitudinal line (the line runs along the middle of the ship and divides it lengthwise into left and right symmetrical halves), and proceeded to video-document the site for the purposes of biological characterisation. Filming covered a belt 50 m long and approximately 2 m wide, extending the entire length of the bathygraphic anomaly.

Description of the wreck site

The oval anomaly clearly observable on the bathymetric map is oriented in a SW-NE direction along its longer axis at a bearing of 68 degrees (Figure 3). The anomaly is 52 m long and 18 m wide and has a total area of 683 m². The morphology indicates a rounded central ridge at a depth of 22 m that rises just over 60 cm above the surrounding area and is accompanied on the SW side by a smaller ridge with a shallow prolongation in the NW direction.

During the survey the central ridge revealed itself to be the remains of the wooden structure of a large vessel partly covered by silt and sand, while the depressions visible on the bathymetric map turned out to be excavations up to 1 m deep made by sea creatures, mainly lobsters (*H. gammaurus*). Strong marine growth and a significant change in the benthic populations of the usual sandy bottom are visible in the wider surrounding area.

The most recognisable element is the central part of the wreck of a wooden vessel with metal sheathing on the underwater part of the hull, a massive skeleton, a wooden

planking and a broad timber running longitudinally which, given its symmetry with the line of the vessel's sides, is probably the keelson and indicates the orientation of the vessel (Figures 4-7). Various pieces of metal elements were observed in the area of the wreck, although in most cases strong marine growth made it impossible to determine their function. Among the identifiable elements that unquestionably relate to shipbuilding are several long cylindrical bolts. Various remains of modern refuse (plastic, textiles, rope) were also visible, having probably been brought to the location by bottom-set fishing nets.

The exposed central section of the wreck then tapers below the sand and silt to the east and west. Beyond it, the line of an iron chain can be traced towards the E, before ending in oval depression (length 6.3 m; width 2.3 m; depth 0.8 m); here a large wooden section of the structure is again visible (Figure 8), with an orientation that coincides with the keelson of the vessel. Visible at the edge of the depression, which is filled with pieces of metal elements overgrown with vegetation, is an iron link chain which stretches for a further 4 m towards the centre of the wreck before disappearing into the sand. The distance from the edge of the depression to the start of the exposed part of the vessel is 13.5 m. The area containing the exposed part of the vessel's structure measures 11.3 m and is up to 3 m wide. On the north side, the wreck is exposed up to the edge of the outer planking, while south of the line of the keelson it is covered by silt. Towards the west the wreck is then almost entirely covered and the seabed becomes increasingly homogeneous; in places it is possible to trace the central line of the keelson, until this disappears entirely in the sediments. An assortment of twisted metal elements measuring 2 x 2 m is located in the westernmost part of the examined area and may be linked to the wreck (Figure 9). The area between the exposed part of the wreck and the metal elements is covered by silt and sand and small coralligenous groups. The entire area in which the remains of the vessel appear – from the furthest edge of the depression at the eastern end to the pile of twisted metal at the western end – measures 32 m. During visual inspection of the sea bottom in the area around the wreck, a wooden block sheave was found about 5-7 m from the keelson in the direction of the buoy (Figure 10). It seems likely that this sheave belongs to the wreck, although the possibility that it is not part of the same wreck and was dragged into the area by a bottom-set fishing net cannot be entirely excluded.

Description of exposed parts of the wreck

Only the exposed parts of the wreck, i.e. parts that are visible on the surface, were documented and measured, without any additional removal of sediments or other interventions on the site. On the northern side, the remains of the wreck are clearly

delimited by a line of malleable brass sheet that was used to sheath the wooden outer skin of the hull. The protective sheathing consists of rectangular sheets 2 mm thick that were fastened to the longitudinal planking of the outer skin (extant thickness around 3 cm) by means of small nails. Although these nails were not visible, the method of attachment is apparent from the holes along the perfectly straight edge of the visible part of the sheet metal (Figure 11). On the exposed side of the vessel we documented 16 frames placed in pairs, each with a width of 30 cm and a thickness of up to 25 cm and spaced 15 cm apart (Figure 12). The pairs presumably consist of floor timbers, i.e. the timbers fixed to the keel, and futtocks, the timbers attached to them that curve up towards the deck forming the shape of the vessel's side. The inside of the floor timbers and futtocks was covered with planking (known as the "ceiling"), consisting of planks around 4 cm thick. While it is not possible to determine the lengths of the individual planks, evidence of the method by which the elements of the vessel's side were fastened together is provided by two documented cylindrical bolts approximately 80 cm long, which, given the absence of the concretion characteristically seen on iron objects found in the sea, were probably made of a copper alloy (Figure 13). The most prominent part of the wreck is a documented 11.2 m section of the keelson, which has a width of between 38 and 39.5 cm and is of unknown thickness (Figure 14). The keelson is a horizontal timber that is placed over the floor timbers at the point where these cross the (outer) keel. Laboratory tests have shown that the wood of the keelson is oak (*Quercus* spp.). The keelson continues below the sand in both directions and a further 5 m segment has been documented on the western side; given the correspondence with its axis in the central part of the area, it is possible to attribute the 1.5 m long and 40 cm wide section of timber on the eastern side of the anomaly to the same structural element. The documented situation shows that the lower part of a ship's hull at least 24 m long survives at the site.

In the central part of the documented section of the keelson, a rectangular chest-like structure is visible, positioned symmetrically around the keelson itself (Figure 15). Its longer sides (parallel to the keelson), are 1.5 m long, while its shorter sides (perpendicular to the keelson) are 1.3 m long. The structure consists of two transverse beams 20-25 cm thick and two planks 4 cm thick. A similar structure of trapezoid shape adjoins it on the NE side. The shorter (transverse) sides of this structure measure 0.77 m while the longer sides measure 1.1 m. The structure is exactly 0.86 m long and consists of beams of a thickness of 5 cm.

Radiometric analysis

The result of radiometric (AMS) analysis of a sample of the wood of the keelson (VZ-1001; Beta-503982), carried out at the Beta Analytic laboratory (Miami, Florida), is of limited

value as regards the chronological placement of the vessel. The analysis showed a conventional radiocarbon age of 260 ± 30 BP, which means that there is a 68.2% probability that the rings of the selected tree at the sampling site grew between 1630 and 1795 (Figure 16).

Comments on the documented remains of the vessel

Structure

Our attempt at a preliminary typological-chronological definition of the vessel is based on the documented structural and technological characteristics of the surviving parts of the hull, the shape of the outer curve of the vessel's side and the estimated length of the waterline, on the materials used and on the results of radiometric analysis of a sample of the keelson.

A projection of the lines of the planking and the keelson indicates that we are dealing with the remains of the lowest part of a ship's hull, the length of which cannot currently be reliably estimated, although the keel length was probably somewhere between 24 and 36 m, while a length of up to around 40 m cannot be excluded. Mapping of the documented line of the hull along the vessel's longitudinal axis indicates a relatively slender but very solidly built craft.

The observed parts of the hull structure consist of a stout keelson, a number of pairs of floor timbers and futtocks with part of the inner planking or ceiling, and outer planking sheathed in malleable brass.

The method by which the planking was fastened to the skeleton has not been established. Two large copper-alloy bolts of a similar type – each with a flattened, rounded head fitted with a ring or washer at one end, and with the other end slightly tapered for ease of insertion – were almost certainly used to fasten the principal elements of the ship's structure. In dimensions and form they are similar to the bolts that were used to fasten elements such as the keel, the deadwood (solid timbers fixed just above the keel) and the keelson by passing through them (hence the name through-bolts) and also to the so-called fender-bolts that were used to fasten elements of the upper part of the hull or deck (e.g. top timbers, knees, wales, etc.). So-called clinched bolts were secured (“clinched”) by placing a ring over the neck of the bolt and striking the head of the bolt with a hammer. This cannot be reliably seen in the case of the bolts from EŠD 29403, but their shape unquestionably points to the age of carvel shipbuilding – the most modern period of construction of wooden sailing vessels in which the hull planks are laid edge to edge to form a smooth surface (McCarthy, 2005: 69–72, 85–86).

The rectangular structure surrounding the keelson may be the remains of a pump well, which in sailing vessels was as a rule located next to the mainmast or below the mizzenmast. Another possibility is that it was a compartment

or enclosure for ballast. There were two types of ballast: permanent ballast, consisting of lead (or pig iron, etc.), and temporary ballast, consisting of rocks. The latter was mainly used when the ship was empty. Both types of ballast serve to improve a vessel's static and dynamic qualities in a lateral direction. In the case of sailing vessels, ballast also increases the vessel's ability to heel safely under sail, in that it represents a counterforce to the wind on the sails. The described characteristics of the skeleton – with evenly spaced pairs of massive floor timbers and futtocks – do not differ essentially from the characteristics of frigates, brigs and similar warships of the period running from the second half of the eighteenth century to the end of the nineteenth century (see e.g. Steffy, 1994: 168–186; Boudriot, 1993: 96), although at the current state of research, given the absence of identifiable finds (guns, sidearms, equipment) it is not possible to define it as a warship. “Double framing” (signifying frames composed of two rows of overlapping timbers) was a standard feature of both merchant vessels and warships of the period, although in the latter case single “filling frames” were sometimes placed between the double frames (Steffy, 1994: figure G-12). “Room and space” is the term for the distance from the edge of one full frame (consisting of floor timber and futtock) to the corresponding point on the adjoining frame, where the part occupied by the frame is called the “room” and the unoccupied distance between it and the adjacent frame is called the “space”. In the case of EŠD 29403, room and space amounts to 75 cm, which corresponds to the dimensions of larger warships such as frigates or fifth-rate ships (Goodwin, 1987: 13). In the case of HMS Charon, a 44-gun fifth-rate (a three-masted “full-rigged” ship with two decks and an overall length of 42.7 metres) mounting a battery of 18-pounders and 12- or 9-pounders, laid down at Harwich in 1778, the measured “room and space” was 71.1cm, while “the floors were sided twelve inches” (in other words the width of a single floor timber was 30.5 cm) (Steffy, 1994: 177). That the dimensions of the frames are relatively large would also appear to be supported by application of the 1871 regulations and rules for the construction of wooden merchant vessels (*Regulations and Rules for the Classification of Wooden Vessels*, Veritas International Register of Shipping, Brussels), which envisages a similar “room and space” (74 cm) for vessels over 50 m long (Fernández-González, 2006: 17.57).

Taking into account the recommendation of an 1830 treatise on marine architecture (Hedderwick, 1830: 157–161) whereby “the floor timbers, at the keel, should be moulded one half inch [1.27 cm] for every foot [30.48 cm] of the ship's extreme breadth, and sided about ten or eleven twelfths of their moulding dimension,” we can calculate that the hypothetical height (“moulding dimension”) of the 30 cm wide floor timbers of EŠD 29403 was around 33 cm or 36 cm, from which it follows that the ship's beam (i.e. extreme breadth) was around 7.9 m or 8.6 m. Later rules (in 1871 and 1921) established that floor timbers with a width of 30 cm

were even sufficient for ships with a beam of around 13–15 m and a length of over 50 m (Fernández-González, 2006: 17.57). A review of the dimensions of American merchantmen built in the 1850s shows that ships with a beam of 9–10 m are mainly found in the group consisting of barques (or barks) of around 35–45 m in length and with a tonnage (cargo-carrying capacity) of 550–560 tons (Crothers, 2013: 10–16). A similar result is offered by a review of the seagoing sailing vessels listed in the *Annuario marittimo* [maritime yearbook] published between 1891 and 1909 by the “Regio Governo marittimo ungherese in Fiume” [the royal Hungarian maritime authority in Rijeka] (Barbalić, Marenić, 2004: 185–247). The ratio between breadth and length in ships of the merchant navy in the nineteenth century was established at approximately 1 : 5.

The relatively modest thickness of the outer and inner planking, which corresponds to the lower end of the recommended range (1½–6 inches = 3.81–15.24 cm; Hedderwick, 1830: 218) and is only just over half the thickness of the planking used in brigs of war and light frigates in the second half of the eighteenth century and the first half of the nineteenth century (Boudriot, 1993: 57; Steffy, 1994: 177) is rather surprising. Even later rules for the construction of merchant ships called for planks of a thickness of 10 cm or more for the inner planking (known as the ceiling), and at least 11 cm for the planks of the underwater part of the hull (Fernández-González, 2006: 17.58).

The ellipsoidally rounded curve of the sides of the lowest part of the hull of EŠD 29403 is very close to the lines of the barque *Grad Karlovac*, built at the Kraljevica shipyard in 1869 (Figure 17). The exquisite shape of this 43.58 m long, 8.55 m wide and 5.78 m high barque built for majority owner Vjenčeslav Turković can be seen in a number of surviving oil paintings and watercolours, while the waterlines (i.e. the contours of the hull at various heights above the keel) are visible in the plans of shipbuilder Vatroslav Arčanin, now kept at the Maritime and History Museum of the Croatian Littoral in Rijeka (Barbalić, Marenić, 2004: 116–120).

The reconstructed curve of the ship's sides, along with its estimated dimensions and the massive proportions and distribution of the elements of the skeleton, support the assumption that wreck EŠD 24903 represents the remains of a merchant brig, a schooner brig (Figure 18) or a large two-masted fore-and-aft schooner. It is worth pointing out that in the nineteenth century sailing ships were classified according to rig, not according to size or tonnage, so a typological definition of a ship that is based solely on the observed part of a hull is of very limited value. Changes of rig were, in fact, relatively common, for example the conversion of barques into brigs by removing a mast. In most cases the motive for such changes was economic (fewer sails = smaller crew = lower costs), so the occasionally unusual cargo capacities listed in maritime yearbooks are not surprising (Barbalić, Marenić, 2004: 4, 12).

The brig, which essentially developed as a variant of the brigantine, is a typical representative of a new concept of shipbuilding as the culmination of thousand years of experience of sailing vessels. This new concept differed from older ships in that it envisaged an increase in sail area, resulting in increased power and thus greater speed, and at the same time a lower, narrower and longer hull with a powerful keel. Particular attention was paid to ballast, because of the greatly increased height of the rigging and the simultaneous increase in sail area. Hulls were rounded in shape with sharp bows and round or square sterns. Crew and passenger quarters and cargo space were entirely within the hull, which was almost flush-decked, with only a minimally raised forecabin and poop (Kozličić, 1993: 196–197).

As medium-large vessels capable of sailing long distances, brigs were used in the nineteenth century for trade in the Mediterranean, on the European Atlantic coasts and, to some extent, as oceangoing vessels. Above all, they were used for the rapid transport of valuable goods. Typical dimensions were: length 32–42 m; breadth 6.5–8.5 m; height 4–5 m; draught 2–2.5 m; tonnage 350–600 tons. They had two square-rigged masts of roughly equal height (a foremast and, aft of it, a slightly taller mainmast) each with between three (older brigs) and five square sails, while the mainmast also had a fore-and-aft gaff-rigged sail (known as the spanker or boom mainsail) behind the (square) mainsail. The change in the number of square sails came in the 1860s, when topsails were divided into lower and upper topsails. Similar changes occurred in other vessels such as barques and ship-rigged (or full-rigged) vessels. Besides the spanker, other fore-and-aft sails sometimes included three to four staysails rigged between the masts and three to four jibs on the bowsprit.

Merchant brigs were armed with guns as protection against pirates. Crews numbered 10–12 men (Gluhonja, 1951, 59–60; Kozličić, 1993, 194–199), while other sources mention crews of up to 17. Large crews and the associated costs were the reason why brigs slowly began to be abandoned, with their place being taken by other sailing vessels at the end of the nineteenth century. In terms of their distribution in the Adriatic and their popularity with mariners, brigs occupied an important place among vessels used for seagoing or long-distance coastwise trade (the latter also known as “great cabotage”), along with barques and brigantines. They proved to be particularly suitable for the transport of Russian grain from the Black Sea ports, since their shallow draft was ideal for the shoal waters of the Black Sea and the Sea of Azov (see Kozličić, 1993: 199).

The second type of two-masted merchant vessel mentioned, the schooner brig, was intended above all for the Mediterranean trade. In terms of their structural characteristics, schooner brigs were similar to brigs, although as a rule smaller and with a smaller cargo capacity or tonnage. Typical dimensions were: length 24–34 m; beam 6–8 m; height 3–4 m, draught 1–1.5 m; tonnage 200–460 tons.

Schooner brigs had a square-rigged foremast with four to five sails and a mainmast rigged with a fore-and-aft mainsail (a gaff sail) and topsail. They were also known as hermaphrodite brigs or, in modern American terminology, brigantines (although a true brigantine had square topsails above a gaff-rigged mainsail). The hull was sheathed in copper or brass. The schooner brig only differed from the brig in terms of the type and number of sails, but this difference meant that it needed a smaller crew, consisting of 8 or 9 men (Gluhonja, 1951: 57–58; Kozličić, 1993: 198).

The two-masted schooner was the largest vessel in the small merchant vessel class, used for long-distance coastwise and oceangoing trade. Average dimensions of such schooners in the Adriatic were: length 16–24 m; beam 4–6 m; height 2–2.5 m; draught approx. 1 m; tonnage 80–222 tons. As a rule, they were extremely well built craft. Their hulls had round lines and a round bottom with a powerful, deep keel, a sharp elongated bow and a round or square stern. The ratio of breadth to length ranged from around 1 : 3.7 to 1 : 4. The skeleton and planking were usually of oak. Both masts were fore-and-aft rigged: the foremast with a gaff foresail and topsail and the mainmast with a gaff mainsail and topsail. Three or even four jibs were rigged between the top of the foremast and the long bowsprit. The crew numbered 5 or 6 men (see Gluhonja 1951, 53–54; Kozličić 1993, 222–224; Simič 2013, 247–259).

At the time of the great expansion of the Austrian merchant navy between 1850 and 1870, shipowners in the Austrian *Küstenland* turned above all to shipyards in Trieste, Rijeka and Lošinj and other major shipbuilding centres within the Empire when it came to purchasing vessels for oceangoing and long-distance coastwise trade. Some ships were also purchased from other European shipyards, particularly in England, and in America (Pahor, 1969: 9–17; Terčon, 2004: 108).

The record of the material state of the Austrian merchant marine, which between 1854 and 1918 was published by the maritime authorities in the *Annuario marittimo*, shows that the number of brigs began to fall rapidly after 1867 (when 137 vessels of this type are recorded), as a consequence of the gradual decline in sail and the rise of steamships. In 1888 only 17 brigs appeared in the *Annuario marittimo*, while the last one appeared in 1892. After this year maritime statistics no longer mention brigs. The last three schooner brigs were still sailing in 1908, while the number of two-masted schooners at the end of the observed period (1868–1911) was 42, which was similar to the number at the beginning (see Terčon, 2004: 124, 140–142, Table 5).

Protective sheathing

The outside of the hull was protected by copper alloy sheathing rolled to a thickness of 0.5–0.6 mm. According to a very rough estimate based on the weight of a sample taken from the wreck, one square metre of sheathing, which is assumed to have consisted of rectangular sheets, weighed

a little over 2.6 kg. Another element for the more accurate determination of the age of the vessel was offered by analysis of the chemical composition of the sheathing. Measurement with a ThermoFisher Niton XL3t 900S-He XRF analyser with an integrated module for metals composition analysis (General mode; measurement times for individual filters: Main 30, Low 30 and High 30) was carried out at the Geology Department of the Faculty of Natural Sciences and Engineering at the University of Ljubljana. Analysis showed that the sample (VZ-1002) consists of an alloy of copper (61%) and zinc (37%), with significant proportions of lead, iron and tin. The results of the analysis are shown in Table 1.

| EŠD 29403 | Cu | Zn | Pb | Fe | Sn |
|-------------|---------|---------|--------|--------|--------|
| VZ-1002 (1) | 60.936% | 37.329% | 0.760% | 0.659% | 0.225% |
| VZ-1002 (2) | 60.8% | 37.6% | 0.7% | 0.5% | 0.2% |

Table 1

The use of metal sheathing to protect the outer parts of a ship's wooden planking from marine weed, barnacles and naval shipworm (*Teredo navalis*) dates back to antiquity, when lead was almost exclusively used for this purpose. After a long period in which there are no records of its use, lead sheathing begins to be mentioned once again in the sixteenth and seventeenth centuries in the context of Spanish, Portuguese and British ships (Bingeman et al., 2000: 218–219; McCarthy, 2005: 102), although considerably less frequently than the more widespread “sacrificial planking” made of pine. In the eighteenth century, these older methods were almost entirely replaced by copper plating, with which the Dutch West India Company had already experimented in the seventeenth century, probably imitating the sheathing of Chinese junks (Duivenvoorde, 2015: 6). In Britain, the Admiralty began fitting its ships with copper plating, usually laid over a layer of tar and felt and fixed with copper nails, in the 1760s. The entire fleet was coppered by shortly after 1780 (Bingeman et al., 2000: 221–222), although the first merchant ships were not given copper sheathing until a decade or so later, and even then only rarely (Steffy, 1994: 174–175). Copper sheathing also began to be used by other navies at more or less the same time (see e.g. Boudriot, Berti, 1993: 150–153; McCarthy, 2005: 107–109).

The standard copper sheets used by the Royal Navy were 4 feet (48 inches) long x 14 inches (121.9 cm x 35.6 cm) wide, giving them an area of 4.3 m². They came in one of three standard gauges of 9.76 kg/m², 8.54 kg/m² and 6.71 kg/m², giving weights of 4.26 kg, 3.73 kg and 2.94 kg per sheet, with thicknesses of 1.09 mm, 0.97 mm and 0.76 mm respectively. The French on the other hand used sheets which varied between 112 cm and 162 cm in length and between 23 cm and 49 cm in width. Estimates suggest that a French 120-gun ship would have required around 4,700 sheets of

copper weighing a total of 16 tons, which represented 1% of the total weight of the ship (Bingeman et al., 2000: 220). British copper sheets were designed to join midway between the horizontal joins of the outer planking. With the standard width of each plank being 30.48 cm (12 inches), the necessary width of the copper sheet was 36 cm to allow a 2.5 cm overlap at the top and bottom of each sheet. Before each sheet was attached to the hull, a layer of tar or pitch was spread across the outer planking. The next step was to stick a layer of paper, canvas or felt onto the layer of tar or pitch. Each copper sheet had the holes for the nails punched by a small hand punch with a collar to ensure that the hole would not be larger than was necessary to take the nail. Under the British nailing pattern, the nails (copper tacks) were spaced at 3–4 cm intervals where the sheets overlapped and about 10 cm apart on the main part of the sheet. The French, on the other hand, used a diagonal pattern (Staniforth, 1985: 28–30).

The significant advantages of copper sheathing, which reduced fouling of the hull with weed and increased sailing speed, were greatly reduced by the harmful phenomenon of galvanic corrosion resulting from the contact of the copper with the predominantly iron fastenings in use at the time (McCarthy, 2005: 103–104). Zinc sheathing was also less successful because zinc corrodes in seawater like copper and breaks down relatively quickly when in galvanic contact with iron (White, 1882: 418–419). Experiments with new alloys of copper such as bronze (copper and tin) and brass (copper and zinc) were thus aimed at taking advantage of copper's resistance to corrosion without weakening the iron parts of the hull. Experiments were also made with iron, pewter, tin and galvanised steel sheathing (Bingeman et al., 2000: 220).

A breakthrough in sheathing methods occurred in England when George Frederick Muntz (1794–1858) developed an alloy of 60% copper and 40% zinc with a small admixture of lead. In October 1832 Muntz secured a 14-year patent for the right to manufacture and sell his metal as sheathing and fastenings (rivets and bolts) for ships (Staniforth, 1985: 27; McCarthy, 2005: 115–118). By the 1840s this form of brass, later known as “yellow metal” or “Muntz metal”, had begun to supplant copper as the principal metal sheathing method used in Britain. Over the following decade its use expanded to foreign- and colonial-built ships (Staniforth, 1985: 27). Muntz's brass proved to be very suitable for sheathing hulls, since it oxidised just enough to keep weeds and barnacles from adhering and corroded more slowly than copper. This meant that it lasted longer than copper and, because it included a large admixture of zinc (a relatively inexpensive metal), it was cheaper to manufacture. It was also lighter and stronger than copper and, unlike most other types of brass, could be rolled hot, which meant that it could be manufactured with a quarter of the effort and time needed to produce brass (McCarthy 2005: 115–116). The original 60% copper and 40% zinc alloy was succeeded by a compound in

which the proportions were 63% and 37%, which could be cold-rolled into thinner sheets than the original. Rectangular sheets of an alloy in these proportions have been found in a series of wrecks of merchant vessels from the second half of the nineteenth century. Some have the marks of the Muntz factory, while others are stamped with the marks of other British and French manufacturers (Bingeman, 2018). Over time it was shown that Muntz's alloy became brittle after long immersion in seawater, because of the galvanic action established between the two metals in the alloy, which results in part of the zinc being removed. The introduction of a third metal, such as tin, appears to prevent this change (White, 1889: 418). Tin is also present in the alloy of the metal sheathing from wreck EŠD 29403. Given the small percentage of zinc and the presence of iron, tin and lead, this alloy would appear to belong to the new generation of brass alloys introduced in the 1850s and 1860s under the names “Aich's metal” (patented 1860; Cu – 60.66%, Zn – 36.58%, Sn – 1.02%, Fe – 0.4 to 3%), “sterro-metal” (Cu – 60%, Zn – 38 to 38.5%, Fe – 1.5 to 2%) or “Gedge's alloy” (Cu – 60%, Zn – 38.2%, Fe – 1.8%) and the common name of “malleable brass”. The addition of iron increased the hardness of the alloys and made working them easier, although at the expense of elasticity and resistance (Brannt, 1908: 155–159). In the second half of the nineteenth century, the Royal Navy replaced Muntz's alloy with an alloy known as “Naval Brass”, consisting of 62% copper, 37% zinc and 1% tin. This was used to make fastenings and sheathing (White, 1889: 418).

A reduction in the weight of sheathing, which was still predominantly manufactured in standard dimensions of 48 x 14 inches (121.9 x 35.6 cm), and a corresponding increase in the speed of ships, had already been achieved through the use of Muntz's alloy. At the beginning of the twentieth century, however, thin rolled brass sheathing weighing just 3.75 kg/m² (Bingeman et al., 2000: 220; Bingeman, 2018) was used on the last wooden sailing ships.

Lists of ships built in the northern Adriatic shipyards of what was then Austria (including Venice, Trieste, Rijeka, Koper, Rovinj, Martinšćica, Mali Lošinj and Muggia) and used for long-distance and “great cabotage” trade, as published in the *Annuario marittimo*, show that even by the 1840s a significant proportion of clippers, brigs, schooner brigs, schooners, brigantines and the largest full-rigged ships were fastened and sheathed with copper (“fitto e foderato in rame”, abbreviated *ffr*), where the lists do not distinguish between copper and copper alloys (see AM, III, 1853: 115–175; AM, IV, 1854: 82–171). By contrast, in the 1891 *Annuario marittimo* published by the “Regio Governo marittimo ungherese in Fiume”, among the great many oceangoing ships designated *ffr* we find two barques with the designation *fdm* for “foderato in metallo giallo”, literally, “sheathed in yellow metal” – i.e. brass. These are the barque *Trojednica*, built in Kraljevica (known as Porto Re in Italian) in 1873, and the barque *Urinj*, built in 1864 in the shipyard at Varazze near Genoa (Barbalić, Marenić, 2004: 191).

Block sheave

The wooden sheave of a block found a few metres from the central part of the wreck is of an irregular round shape with dimensions 20 x 22.5 cm and a thickness of 2.5–2.7 cm (Figures 19 and 20). A shallow groove for a rope or cord runs round the circumference of the sheave. The sheave was probably fixed into the block by means of an immovable metal axis which did not rest directly against the hole (Ø 4.5 cm) in the sheave but instead passed through a partially preserved bearing that prevented the sheave from being worn away. On one side this bearing widens into a triangular plate with sheared corners, while on the other the cylindrical bush ends in a flange. The bearing, which is made of an as yet not precisely identified graphite material, was attached to the sheave by means of three iron nails.

Analysis of the wood of the sheave, carried out at the University of Ljubljana Biotechnical Faculty's Department of Wood Science and Technology, confirmed the assumption that it is guaiacum wood (*Guaiaecum* spp.), also known as *lignum vitae*. The *Guaiaecum* genus is part of the *Zygophyllaceae* family and the two commercial species of guaiacum wood are *Guaiaecum officinale* and *G. sanctum*, which are anatomically identical.

Detailed analysis of the wood of the sheave revealed the basic anatomical characteristics of guaiacum wood (Wheeler, 2011; Richter, Dallwitz, 2002). The vessels of guaiacum wood are diffuse porous and exclusively solitary with an average tangential vessel diameter of around 100 µm. Deposits are frequently present in heartwood vessels. Vessel elements are oval and thick-walled, with simple perforation plates. Intervessel pits alternate. The basic tissue is formed of libriform fibres and fibrous tracheids. Fibres are very thick-walled. Axial parenchyma is apotracheal, or paratracheal. Apotracheal axial parenchyma is diffuse, or diffuse-in-aggregates. Paratracheal axial parenchyma is scanty, or vasicentric (often incomplete), or unilateral (Figure 21 a). Ray tissue is homogeneous, with rays composed of a single cell type (homocellular) (Figure 21 b). Rays are exclusively uniseriate, and storeyed. (Figure 21 c).

Guaiacum, an evergreen tree native to the West Indies and widespread on the southern coasts of the USA and in northern parts of South America, is characterised by extremely compact and hard wood, the durability of which made it ideal for manufacturing the load-bearing elements of shrouds and stays. Thanks to its extremely high density (basic density between 950 and 1300 kg/m³), good compressive strength, homogeneity, high resin content in heartwood, self-lubricating and hydrophobic qualities, guaiacum wood was used to manufacture pulley blocks, sheaves, rope guides, self-lubricating bushes for marine shafts, as a substitute for brass and grey cast-iron in bearings (e.g. Record, Hess, 1949), for railway sleepers, for a wide variety of turned products including works of art, tool handles, bowling balls, sprockets and even parts of clocks (Orwa et al., 2009; Torelli, 2006).

In view of the dimensions of our find, it is most probably part of a pulley or block that served as a guide for part of a ship's standing rigging such as a shroud or a stay (see Mardešić, 1944: 162–164, 175–252). The piece in question, with its characteristic triangular bush plate, corresponds closely to descriptions and depictions in British shipbuilding manuals and encyclopaedias (e.g. Steel, 1794: 154–155; Blocks – pl. 1; Rhind, 1841: 450; see Clark, 1976, 138, 141–142, Figure 2), where pulley coaks (metallic bushes in the centre of wooden sheaves) are described as usually being made of ordinary brass. Also compares well to finds from wrecks and still functional parts of ship's tackle from the eighteenth and nineteenth centuries in areas as far apart as North America and Tasmania (e.g. the brig *Belinda*, built at Yarmouth and wrecked in Goose Island Bay, Western Australia, in 1824; the whaler *Charles W. Morgan*, launched in 1841 at New Bedford, Massachusetts), where the use of guaiacum wood is just one of numerous indicators of the global transatlantic economy. More than 60 pulley sheaves ranging from 9 to 22 cm in diameter were recovered off the coast of Tasmania from the wreck of the *Sydney Cove* (a Calcutta-built ship originally named *Begum Shaw* and renamed in 1796). All these sheaves were made of guaiacum wood (*lignum vitae*), which was imported as a raw material from the Americas. The sheaves themselves were manufactured in Bengal (Nash, 2009: 129–130). The scale of production for the Royal Navy and merchant fleets in Britain, as attested for the dockyards in Portsmouth and Southampton in the eighteenth and nineteenth centuries, is illustrated by the fact that “a 74-gun ship (a 3rd rate) required 1,400 various blocks for the running gear of the sails and for handling the guns” (Clark, 1976: 137).

A large number of sheaves from pulley blocks, including several specimens similar to the find from the area of wreck EŠD 29403, were found among the remains of the French-Italian brig *Mercure*, the wreck of which lies on the seabed 7 nautical miles (11 km) south of Lignano at a depth of 17–19 m. The *Mercure* was sunk in a battle between ships of the British and Napoleonic fleets on the night of 21–22 February 1812. Captions to depictions of the battle painted in the following decades state that it took place “off Pirano [Piran], ten miles from the coast of Istria, in the *libeccio* [SW] direction”. The battle became known as the “Battle of Pirano” (Žitko, 1999: 24–27; see Montani, 1963; Prikrič, 1980: 243–244; Grioni 1988; Safonov, 1988: 181–182), although some Italian literature refers to it as the “Battaglia di Grado” (Battle of Grado). The *Mercure* was part of a family of 50 similar brigs with very similar characteristics built by the French Republic between 1800 and 1813 (Beltrame, Gaddi, 2002; Beltrame, 2009, 2014). These were brigs of war, faster and with broader sails than their mercantile counterparts. Their dimensions were as follows: length 32 m; beam 9 m; displacement 400/450 tons (Boudriot, Berti 1981). Of the approximately 50 sheaves recovered from the wreck of the *Mercure*, most are made of guaiacum wood. Their diameters range from 6 to 25 cm and

they are between 1.8 and 4 cm thick. Many of these sheaves are fitted with bushes made of ordinary brass; 18 of the latter have triangular plates or flanges with holes for nails in them (Beltrame, Fadda, 2014: 94–96, Figure 2).

The results of mineralogical analysis (XRD) using X-ray powder diffraction define the material used to make the bearing of our sheave from the vicinity of wreck EŠD 29403 (Figure 19) as graphite (C) with traces of wüstite (FeO). By profile fitting the X-ray diffraction pattern to the structure of the graphite and wüstite, we then determined the amorphous phase content of the sample with the help of external standard NIST-676a (Figure 22).

The grain size of the structure of the graphite (Figure 23) and potential traces of other material on the surface do not allow us to determine precisely what type of graphite material we are dealing with, at this stage of research. The structure could correspond to synthetic graphite that has flocculated from a colloid state. This material was a by-product of a series of experiments by the American chemist Edward G. Acheson (1856–1931) following his registration of a patent for the manufacture of synthetic graphite in 1896 (Acheson, 1907: 33). Despite this, it is at least equally likely that the bearing was made from natural graphite, the use of which for various purposes boomed with the exploitation of deposits in Austria, Germany and the United States of America in the mid-nineteenth century. The bearing was most likely manufactured by being pressed into a mould.

Historical literature states that bearings made of hard maple or ironwood (*Olnya tesota*), thoroughly impregnated with graphite and other lubricants, in which a slight rise in temperature as a result of friction caused the wood to secrete part of the lubricant, were more suitable than inserts made of graphite materials for use in loose pulleys. Another type of self-lubricating bearings and bushes was made of “graphalloy”, a name used for a group of composite materials made of deflocculated graphite, produced by placing graphite in a vacuum to extract the air and then forcing in molten white metal or “Babbitt metal” under tremendous pressure (see Dowd, 1930: 28, 154). Thanks to their self-lubricating qualities and resistance, bearings and bushings made of “graphalloy” (see *Bearings and Bearing Metals*, 1921: 19–21) were particularly suitable for maritime use, although direct comparisons for this use of graphite in the blocks and pulleys of wooden sailing vessels are not known to the authors of this paper.

Shipbuilding science of the pre-modern period preferred metal – steel or “phosphor bronze” – as a material for the bushes of wooden sheaves, which as a rule were made of elm or guaiacum wood (Milošević, 1955: 145). Phosphor bronze is an alloy with a low coefficient of friction and good mechanical properties, and is also resistant to seawater.

In the context of the considered combination of materials for the sheave – if this actually belongs to wreck EŠD 29403 – the choice of guaiacum wood, a globally popular material for the load-bearing parts of a ship's rigging which was also

used for the same purposes in the shipyards of the northern and eastern coasts of the Adriatic (see Milošević, 1955: 145; Radimir, 1959: 185), could indicate an origin in one of the shipbuilding centres of England or North America, while the theory that the ship (or at least part of its tackle) may originate from the east coast of the USA is supported by the graphite bearing.

Biological characterisation of the site

A 50 m transect crossed the entire area of anomaly EŠD 29403, slightly to one side of the longitudinal axis of the wreck and running in a SW–NE direction (Figure 24). The sea bottom consists of a predominantly sandy component, with practically no silt in the topmost layer. The majority of the transect is represented by clusters and patches of sponges (Figures 25 and 26). In terms of distribution, we can talk about two separate areas between which there is a part of the transect (between the 19 m point and the 26 m point) in which sponges were not observed. At the start of the transect, up to the 1.5 m point, the bottom is still bare sand. After this, clusters of sponges start to appear. At the 5.8 m point we observe an area of black wood on the left (northern) side of the transect that for the most part is not covered by marine growth, or only slightly covered with individual sponges of crusty appearance. Spider crabs (*Inachus* sp.) are present in the wood (Figure 27). On the right-hand side of the transect is an iron chain that, unlike the wood, is heavily covered with sponges. At the 7.5 m point where the chain is no more visible in the transect and the bottom is sandier, without larger visible solid elements, although clusters of sponges still appear, along with larger condensed areas of sponges. Between 13.5 m and 27.7 m there are fewer sponges because the bottom mainly consists of wooden remains or sand without larger solid elements. Between 19 m and 24 m there are no sponges at all. Spider crabs (*Inachus* sp.) are present in the wood, while calcareous coating of the boreholes indicate the presence of naval shipworm (*Teredo navalis*). Between 32.5 m and 35.5 m larger structured areas of solid bottom appear, with lobster (*H. gammarus*) holes beneath them. Sponge cover is very noticeable and scorpionfishes (*Scorpaena* spp.) appear among the sponges. There are also a large number of variegated scallops (*Chlamys varia*). Between 35.5 m and 38 m, the number and area of visible solid remains both decrease, as do the patches of sponges. Between 38 m and 48 m larger clusters of sponges appear, after which sandy bottom with patches of coarse organic detritus and spiny brittle stars (*O. quinqueaculata*), coralligenous algae and individual sponges predominates.

A list of all observed and identified taxa is given in Table 2. Sponges, which are the main biogenic structural element, dominate in terms of number of taxa and biomass. The coralligenous area is quite a lot larger and represents roughly 60% of the area along the transect. The high presence of sponges and coralligenous assemblages is clearly

| | Broader taxon | Narrower taxon |
|----|---------------------|-----------------------------------|
| 1 | sponge | <i>Suberites domuncula</i> |
| 2 | sponge | <i>Clathria compressa</i> |
| 3 | sponge | <i>Haliclona mamillata</i> |
| 4 | sponge | <i>Haliclona</i> sp. |
| 5 | sponge | <i>Dysidea avara</i> |
| 6 | sponge | <i>Axinella damicornis</i> |
| 7 | sponge | <i>Aplysina cavernicola</i> |
| 8 | sponge | <i>Crambe crambe</i> |
| 9 | sponge | <i>Crella</i> sp. |
| 10 | sponge | <i>Geodia cydonium</i> |
| 11 | sponge | <i>Cliona viridis</i> |
| 12 | sponge | <i>Cliona celata</i> |
| 13 | sponge | <i>Tedania anhelans</i> |
| 14 | sponge | <i>Antho inconstans</i> |
| 15 | sponge | <i>Ircinia</i> sp. |
| 16 | sponge | <i>Tethya aurantium</i> |
| 17 | sponge | <i>Tethya citrina</i> |
| 18 | sponge | <i>Ulosa stuposa</i> |
| 19 | sponge | <i>Petrosia filiformis</i> |
| 20 | sponge | <i>Spirastrella cunctatrix</i> |
| 21 | cnidarian | <i>Cereus pedunculatus</i> |
| 22 | cnidarian | <i>Hydrozoa</i> |
| 23 | bivalve mollusc | <i>Chlamys varia</i> |
| 24 | bivalve mollusc | <i>Teredo navalis</i> |
| 25 | sea slug | <i>Jorunna tomentosa</i> |
| 26 | squid | <i>Loligo vulgaris</i> |
| 27 | bristle worm | Serpulidae |
| 28 | crab | <i>Inachus</i> sp. |
| 29 | crab | <i>Medorippe lanata</i> |
| 30 | crab | <i>Maja squinado</i> |
| 31 | decapod | <i>Homarus gammarus</i> |
| 32 | echinoderm | <i>Ophiothrix quinquemaculata</i> |
| 33 | echinoderm | <i>Holothuria</i> sp. |
| 34 | ascidian | <i>Diplosoma spongiforme</i> |
| 35 | ascidian | <i>Didemnum</i> sp. |
| 36 | ascidian | <i>Ascidia mentula</i> |
| 37 | ascidian | <i>Asciidiella adspersa</i> |
| 38 | ascidian | <i>Phalusia mamillata</i> |
| 39 | fish | <i>Seranus hepatus</i> |
| 40 | fish | <i>Trachinus draco</i> |
| 41 | fish | <i>Gobius cruentatus</i> |
| 42 | fish | <i>Scorpaena</i> spp. |
| 43 | fish | <i>Conger conger</i> |
| 44 | fish | Heterostomata |
| 45 | coralligenous algae | |

Table 2: Taxa identified in the transect of area EŠD 29304

connected to the area of solid bottom that has developed on the wreck of the vessel, although apparently not to its wooden remains, which for the most part are only covered with very slight marine growth.

Conclusion

The identification, documentation and risk assessment carried out with regard to archaeologically and culturally historically interesting remains on the seabed off Piran represent an important step in the development of inter-institutional cooperation in the research and conservation of natural and cultural heritage in Slovenia's territorial waters that could also represent the beginning of closer cooperation between individual scientific disciplines and enhancement of sectoral policies regarding the management and planning of the use of marine areas.

Notable among the archaeological results of the operation in 2018 is the identification via bathygraphic survey of the anomaly designated EŠD 29403 as the wreck of a large vessel which, on the basis of the documented dimensions and structural characteristics of the skeleton and planking, radiometric dating and the use of malleable brass sheathing on the outside of the hull, combined with the absence of identifiable finds of a military nature, may with some reservations be defined as the wreck of a two-masted merchant vessel between 24 and 36 m long, presumed to have sunk in the middle or second half of the nineteenth century. A further indication that this was a vessel built for seagoing or long-distance coastwise voyages (possibly a brig, a schooner brig or a large two-masted schooner) from the end of the age of wooden sailing ships is provided by the dimensions of the bolts used to fasten the main hull elements. The proposed dating is also supported by the sheave of a rigging block made of guaiacum wood (*Guaiacum* spp.) and fitted with a pressed graphite bearing, the use of which became widespread in the mid-nineteenth century. The combination of materials from which the sheave – discovered a few metres from the wreck – was made could indicate that the vessel, or at least part of its rigging, originated in the shipbuilding centres of England or on the eastern US seaboard. If further studies were to show that the bearing of this sheave is made of synthetic graphite, this would shift the dating to the period after the patenting of this material in 1896.

The condition of the surviving part of vessel EŠD 29403, which evidently only comprises the lowest surviving part of the hull, up to a maximum height of 1 m, appears stable, although still exposed to damage caused by bottom fishing gear. Examination of two other anomalies (EŠD 29401 and EŠD 29402) on the seabed did not yield any finds suggesting the presence of buried shipwrecks, so further research will be necessary in order to define the character of these raised areas of seabed.

Further research in the form of probes at selected points of the hull of EŠD 29403 will facilitate a more reliable typological definition and, with a little luck, identification of the vessel itself, and of its loss, in the lists of shipwrecks published annually by the Lloyd Austriaco/Österreichischer Lloyd shipping company or the "I. R. Governo centrale marittimo" (the central maritime authority of the Austro-Hungarian Empire) in Trieste (see: Archivio di Stato di Trieste, fondo 340, fasc. 18/2 – *Sinistri marittimi*). One of the bathygraphic anomalies detected in the sector north of Savudrija perhaps conceals the remains of the "nave" (indicating a three-masted, ship-rigged vessel) *Milka Dobrota*. This ship was built in 1864 on Prince Edward Island, Canada, and originally sailed under a British flag, named after owner "L. C. Oven". In December 1869 the *Milka Dobrota* was lost together with her 11-man crew "nelle vicinanze di Salvore" [i.e. off the coast of Savudrija] (*Annuario marittimo*, XX, 1870: XXXIV, 82).

All the investigated areas are also extremely important from the point of view of biodiversity and nature conservation. Areas in which a solid substrate appears, and on it coralligenous elements in which sponges predominate in terms of mass, are particularly interesting. The sponges include protected species such as *Tethya aurantium*, *T. citrina*, *Verongia cavernicola* and the giant brain sponge (*Geodia cydonium*). These areas are also an interesting habitat for another protected species, the lobster (*H. gammarus*), and for edible fish such as the scorpionfish (*Scorpaena* spp.), soles and the European conger (*C. conger*).

Good knowledge of the species present also has a direct applicable value for identification of archaeological remains and the planning of conservation measures. As was also demonstrated during this research, the presence and concentrated distribution of certain species or groups of organisms such as sponges indicate the presence of a solid substrate and a potential archaeological site. Some species, such as the boring sponges of the genus *Cliona* or the naval shipworm *Teredo navalis*, can also represent a risk to remains, while on the other hand sponge growth protects the surface of artefacts from abrasion or superficial damage. During the research, guidelines were formulated for monitoring and supplementary studies, the realisation of which was not possible during the operation in 2018 because of time and financial constraints. As well as ensuring the suitably solid installation of the initial and end points of permanent transects, it would be worth devoting greater attention to areas containing larger patches of sponges and other epifauna, and those places where archaeological remains are visible and exposed on the surface. In such places, a more detailed inventory of smaller and more hidden cryptobenthic fauna in 1 x 1 m quadrants would be necessary in order to obtain a more complete insight into the actual diversity of populations. It would be a good idea to install fixed markers there, for the needs of photogrammetry. These could serve as a basis for further monitoring.

In areas where an epibenthic population indicates a solid substrate but this is not clearly expressed on the surface or is of unknown origin, core sampling of the seabed would also be necessary.

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Saša Dolinšek, Katja Kavkler

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Izvilleček

Na Oddelku za les Restavratorskega centra Zavoda za varstvo kulturne dediščine Slovenije v Ljubljani smo se prvič srečali z deli Jožefa Strauba leta 2015. V okviru rednega programa, ki ga financira Ministrstvo za kulturo Republike Slovenije smo v dogovoru z odgovornimi iz Pokrajinskega muzeja v Mariboru, v restavratorski atelje prepeljali štiri lesene polikromirane plastike, ki so bile nekoč del velikega oltarja v Studencih, danes pa so razstavljene v oglednem depozitu Pokrajinskega muzeja v Mariboru. Med leti 2015–2018 smo izvajali posege na lesenih polikromiranih plastikah *Vera*, *Upanje in Ljubezen*, *dveh angelih adorantih*, *kerubu*, *angelski glavici*, *treh puttih in dveh kerubih z oltarne preklade*. V sklopu projekta TrArS (*Tracing the Arto f the Straub Family*) smo med terenskimi ogledi Straubovih del v dveh cerkvah odkrili zelo poškodovane umetnine in smo jih, da jih rešimo nadaljnega propada, prepeljali v restavratorski atelje Restavratorskega centra v Ljubljani. Gre za dve polikromirani plastiki sv. Janeza Nepomuka in sv. Jožefa z Jezusom iz cerkve sv. Danijela v Štanjelu in glavni veliki oltar sv. Areha iz cerkve sv. Areha na Frajhajmu (Areh na Pohorju). Z vseh barvnih in kovinskih plasti smo vzeli vzorce za naravoslovne preiskave, s pomočjo katerih smo poleg sondiranja barvnih plasti pridobili dodatne dragocene podatke o materialih ter prejšnjih posegih in predelavah.

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Mikroskopske in spektroskopske analize slikovnih slojev z lesenih polikromiranih plastik Jožefa Strauba

V okviru projekta TrArS smo imeli možnost analizirati več kipov, ki jih je izdelal Jožef Straub, med drugim veliki oltar iz župnijske cerkve sv. Jožefa na Studencih (Maribor) iz l. 1750, ki ga hranijo v Pokrajinskem muzeju Maribor, s katerega smo analizirali slikovne sloje 9 različnih puttov in angelov (STJ003 do STJ011), sv. Jožefa z detetom (STJ013) ter sv. Janeza Nepomuka (STJ014) iz cerkve sv. Danijela v Štanjelu, stranski oltar sv. Lucije iz cerkve Matere Božje v Podlehniku (STJ017), Marijin oltar v kapeli (STJ018) in prižnico (STJ019) iz cerkve sv. Marjete v Selnici ob Dravi, kip Boga Očeta (Stvarnik) iz muzeja v knjižnici Minoritskega samostana na Ptuj (STJ020), stranski oltar v cerkvi sv. Mihaela v Črešnjevcu (občina Slovenska Bistrica; STJ021) ter glavni oltar sv. Areha v cerkvi sv. Areha na Pohorju (STJ022). Vzorce iz cerkve sv. Danijela v Štanjelu (STJ013 in STJ014) smo primerjali z vzorci, ki so bili odvzeti s kipa sv. Gregorja neznanega avtorja iz te cerkve (GRE). Vsa preiskana dela so našeta v tabeli 1, skupaj z delovnimi oznakami, ki nam služijo kot orientacija pri delu in navajanju rezultatov. V okviru raziskav smo analizirali tako najstarejše sloje poslikav, kot tudi nekatere preslikave. Domnevamo, da smo

na ta način dobili informacije tako o prvotnih slojih, kot tudi o kasnejših predelavah. Ker pa so s kipov ob preno- vah pogosto povsem odstranili vse slikovne sloje, pogosto ne moremo z gotovostjo trditi, da so najstarejši sloji na lesu dejansko tudi prvotni.

| Del. oznaka | Predmet | Naslov | Kraj | Datacija |
|-------------|-------------------------------|--|---------------------------------------|-------------------|
| STJ003 | kip "Angel z vinsko trto" | Pokrajinski muzej Maribor (oltar iz Studencev) | Maribor | 1750 |
| STJ004 | kip "Angel z žitnimi klasi" | Pokrajinski muzej Maribor (oltar iz Studencev) | Maribor | 1750 |
| STJ005 | kip "Ljubezen" | Pokrajinski muzej Maribor (oltar iz Studencev) | Maribor | 1750 |
| STJ006 | kip "Upanje" | Pokrajinski muzej Maribor (oltar iz Studencev) | Maribor | 1750 |
| STJ007 | kip "Putto s knjigo" | Pokrajinski muzej Maribor (oltar iz Studencev) | Maribor | 1750 |
| STJ008 | kip "Putto", inv. št. N 468 | Pokrajinski muzej Maribor (oltar iz Studencev) | Maribor | 1750 |
| STJ009 | kip "Vera" | Pokrajinski muzej Maribor (oltar iz Studencev) | Maribor | 1750 |
| STJ010 | kip "Angel" | Pokrajinski muzej Maribor (oltar iz Studencev) | Maribor | 1750 |
| STJ011 | kip "Putto", inv. št. N 13930 | Pokrajinski muzej Maribor (oltar iz Studencev) | Maribor | 1750 |
| STJ013 | kip "Sv. Jožef z detetom" | c. sv. Danijela | Štanjel | 1741 |
| STJ014 | kip "Sv. Janez Nepomuk" | c. sv. Danijela | Štanjel | 1741 |
| STJ015 | kip "Angel 1" | Pokrajinski muzej Maribor (oltar iz Studencev) | Maribor | 1750 |
| STJ016 | kip "Angel 2" | Pokrajinski muzej Maribor (oltar iz Studencev) | Maribor | 1750 |
| STJ017 | stranski oltar sv. Lucije | c. Matere Božje | Podlehnik | 1752 |
| STJ018 | Marijin oltar v kapeli | c. sv. Marjete | Selnica ob Dravi | 1750 |
| STJ019 | prižnica | c. sv. Marjete | Selnica ob Dravi | 1750 |
| STJ020 | kip "Stvarnik" oz. "Bog Oče" | Minoritski samostan Ptuj, muzej v knjižnici | Ptuj | 1752 |
| STJ021 | stranski oltar | c. sv. Mihaela | Črešnjevce, občina Slovenska Bistrica | |
| STJ022 | glavni oltar sv. Areha | c. sv. Areha | Frajhajm, Areh na Pohorju | 1756 |
| GRE | kip "sv. Gregor" | c. sv. Danijela | Štanjel | 18. ali 19. stol. |

Tabela 1: Seznam preiskanih predmetov z delovnimi oznakami.

Metode

V okviru analiz so nas zanimali uporabljeni materiali in način ter nanašanja slikovnih slojev (stratigrafija). Da bi kar največ izvedeli o stratigrafiji, smo prečne preseke vseh vzorcev najprej pregledali z optičnim mikroskopom. Tako smo določili zaporedje slojev, ugotovili, kateri sloji domnevno sodijo med prvotne ter ugotavljali število predelav. Izbrane vzorce smo nato preiskali z ramanskim spektrometrom, s katerim smo identificirali pigmente in polnila slikovnih slojev, z infrardečim spektrometrom (FTIR), s katerim smo poskušali identificirati organske materiale (veziva in površinske premaze), dobili pa smo tudi informacije o nekaterih anorganskih materialih ter o prisotnosti nekaterih produktov razgradnje pigmentov (npr. kalcijev oksalat in karboksilati oz. mila).

Rezultati analiz z razpravo

Pri analizah angelov in puttov z oltarja iz cerkve na Studencih nas je zanimala predvsem sestava inkarnatov, las ter kovinskih slojev, ki pokrivajo draperije in krila. Ugotovili smo, da je bil pod barvnimi sloji sloj osnove izdelan iz kalcita, ki ima v nekaterih vzorcih tudi primes aragonita ali silikatov (npr. kaolinit). Vezivo slojev podloge je bilo proteinsko, s FTIR spektrometrom pa nismo mogli zagotovo ugotoviti njihovega izvora, saj imajo beljakovine različnega izvora (klej, kazein, jajčni beljak in rumenjaki) zelo podobne spektre, ki jih po kemičnih spremembah zaradi staranja in absorpcijskih trakov drugih materialov v spektru ne moremo razločiti. Enaka podloga kot pod barvnimi sloji je bila uporabljena tudi na področjih, ki so površinsko obdelana s kovinami (pozlate, posrebitve), izjema sta le kipa dveh angelov (STJ015 in STJ016), kjer je pod kovinskimi sloji nanesena podloga iz sadre, prav tako vezana s proteinskim vezivom. Lahko gre za drugačno tehnologijo izdelave, bolj verjetno pa je, da ne gre za prvotno površinsko obdelavo.

Čez sloj podloge je bil na večini preiskanih področij po slojem inkarnata in las nanesen sloj izolacije, izdelane iz proteinskega veziva, najverjetneje kleja (slika 1). Najstarejši barvni sloji v preiskanih vzorcih z oltarja v Studencih so bili nanesen eno- do dvoslojno, kot vezivo pa je bilo uporabljeno sušljivo olje. Inkarnati so bili obarvani z mešanico svinčeve bele in cinobra, ki sta bila najpogosteje uporabljena pigmenta svoje barve v baroku (Koller, 1997: 364, 367). Kjer je prisoten tudi barijev sulfat (pri kipih STJ008, STJ015 in STJ016) najverjetneje ne gre za prvotne sloje, saj je bil sintetičen barijev sulfat izdelan šele v 19. stol. (Eastaugh idr., 2004: 64). Poleg cinobra na kipu putta s knjigo (STJ007) identificiramo tudi litharge, rdeč svinčev oksid, v kipu angela (STJ016) pa tudi hematit (železov oksid, rdeč zemeljski pigment). Domnevamo, da tudi v teh dveh primerih ne gre za prvotne sloje.

Analizirali smo tudi sestavo bolusa na kipih STJ015 in STJ016. Izdelan je bil iz arzenovega sulfida (realgar ali pararealgar). Pri bolusih preostalih kipov z ramansko analizo nismo dobili smiselnih rezultatov, domnevamo pa da gre za žgan železooksidni pigment.

Preiskali smo tudi tri kipe iz cerkve sv. Danijela v Štanjelu. Vsi trije kipi so bili ob zadnjih prenovah obarvani v belo oz. sivo, domnevno, da bi dosegli videz kamna. Dva preiskana kipa sta delo Jožefa Strauba: sv. Jožef z detetom (STJ013) in sv. Janez Nepomuk (STJ014), kip sv. Gregorja (GRE) pa je delo neznanega avtorja iz 18. ali 19. stol. Pri vseh treh kipih so nas zanimale tako prvotne poslikave kot tudi kasnejše predelave. Ob pregledu stratigrafij obeh Straubovih kipov smo pri večini preiskanih vzorcev opazili 10 do 15 slikovnih slojev: podlog, barvnih slojev, slojev premazov, kovinskih slojev idr. (slika 2)

Za najstarejše sloje v kipih STJ013 in STJ014 smo domnevali, da so prvotni, delo Jožefa Strauba. Podloge so izdelane dvoslojno, spodnji sloj iz kalcita, zgornji pa iz gipsa (sadre oz. bolonjske krede), kar je drugače kot pri kipih iz Studencev. Vezivo je bilo najverjetneje proteinskega izvora. V nekaterih vzorcih izgleda, kot da mu je bila dodana maščobna komponenta (mastna tempera). Vezivo barvnih slojev je bilo sušljivo olje. Pigmenti v najstarejših slojih so bili svinčeva bela, cinober, hematit, ogljikova črna ter domnevno smalt. Podobno kot pri oltarju iz Studencev tudi v Straubovih kipih iz Štanjela pod barvnim slojem inkarnata opazimo sloj premaza, kar potrjuje našo domnevo o originalnosti teh slojev.

Kip sv. Gregorja neznanega avtorja kaže manj slojev, že ob prvi prenovi pa je bil pobarvan enobarvno (slika 3). Zato sumimo, da je nastal kasneje kot Straubovi deli. Zgornjih pet slojev vseh treh kipov je enakih: hladna bela (svinčeva bela), topla bela (barijev sulfat in svinčeva bela), dva sloja cinkove bele ter zgornji sivi sloj (anataz, barijev sulfat, ogljikova črna). Sestava prvotnih slojev se razlikuje od Straubovih del, predvsem je značilna prisotnost barijev sulfata ob svinčevi beli, ki je pri Straubovih kipih nismo opazili.

Ker ne poznamo natančne zgodovine analiziranih kipov, nam analize stratigrafij in uporabljenih materialov lahko pomagajo pri rekonstrukciji prvotne polikromacije in časovnega poteka obnov oz. predelav. Pri slednjem se opiramo na časovne okvirje uporabe določenih materialov, ki so bili odkriti oz. uporabljeni šele po določenem časovnem mejniku ali pa so jih v znanem časovnem obdobju prenehali uporabljati. Med take pigmente sodi svinčeva bela, ki je bila do l. 1835 edini bel pigment v slikarstvu in polikromirani leseni plastiki (Schramm, Hering, 1988: 28). Kasneje so jo nadomestili drugi beli pigmenti, ki imajo nekatere lastnosti boljše, predvsem pa niso strupeni. Mednje sodi cinkova bela (cinkov oksid), ki so jo kot pigment začeli uporabljati ob koncu 18. stol., industrijsko pa izdelovati v letih 1835 do 1844, tako da se je njena uporaba močno povečala po letu 1845 (Eastaugh idr., 2004: 414). Uporaba barijevega sulfata (barita oz. permanentne bele) se je povečala po l. 1830, ko je na trg prišel sintetični analog, uporabljen predvsem kot polnilo (Eastaugh idr., 2004: 46). V 20. stoletju pa se je seznam belih pigmentov pridružila še titanova bela, ki je danes najpogosteje uporabljen bel pigment, od prve svetovne vojne do l. 1938 v kristalni obliki anatas, kasneje pa kot rutil [(Eastaugh idr., 2004: 366).

Tako lahko na podlagi rezultatov analiz ocenimo, da je sv. Gregor nastal po l. 1830, saj že prvotni sloji vsebujejo barijev sulfat, še nekoliko kasneje pa so vse tri preiskane kipe iz cerkve sv. Danijela v Štanjelu premazali z mešanico svinčeve in barijeve bele. Premazi s cinkovo belo so bili nanaseni v drugi polovici 19. stol. ali v začetku 20. stol., zgornji sivi premazi pa med vojnami.

Analizirali smo tudi več Straubovih kipov iz drugih cerkva (STJ017 do STJ022), kjer smo s posameznih kipov odvzeli po en do tri vzorce, medtem ko smo z glavnega oltarja sv. Areha v cerkvi sv. Areha na Pohorju (STJ022) odvzeli več vzorcev. Podloga vseh teh kipov je bila izdelana s proteinskim vezivom ali mastno tempero, kot polnilo pa je bil večinoma uporabljen kalcit, na prižnici v Selnici ob Dravi (STJ019) z dodatkom aragonita. Vzorca Stvarnika s Ptuja (STJ020) in stranskega oltarja v Črešnjevcu (STJ021) pa v zgornjih slojih podloge vsebujejo sadro, STJ021 tudi anhidrit. Spodnji sloj podloge v vzorcu STJ021 je iz kalcita (slika 4). Domnevno gre za edini prvotni sloj v tem vzorcu, saj se sestava inkarnata razlikuje od drugih Straubovih del.

Podobno kot v kipih iz Studencev in Štanjela pa tudi na kipu sv. Lucije iz Podlehnik (STJ017) opazimo značilen nanos proteinske izolacije pod inkarnatom. V kipu sv. Lucije se ujema tudi materialna sestava inkarnata, ki se pri ostalih kipih razlikuje. Proteinski premaz čez podlogo manjka na kipih s prižnice v Selnici ob Dravi (STJ019) in stranskega oltarja v Črešnjevcu (STJ021) ter v kipu sv. Pavla z oltarja sv. Areha (STJ022 11), kjer domnevno prvotne barvne plasti niso prisotne, kar potrjuje tudi drugačna materialna sestava omenjenih inkarnatov. Tako je v inkarnatu s prsta sv. Pavla poleg cinobra in svinčeve bele prisoten tudi pigment pruska modra, ki je bil ob času nastanka oltarja poznan že

približno 50 let (Eastaugh idr., 2004: 314), vendar pa ga ne opazimo v drugih Straubovih delih. Dopuščamo tudi možnost, da je umetnik pri tem delu spremenil tehnologijo.

Domnevamo, da je prvotni tudi marmorino z oltarja v Podlehniku (STJ017), ki je izdelan na kalcitni podlogi s proteinskim vezivom. Tudi vezivo marmoriranja je proteinsko, umetnik pa je za vtis marmorja uporabil svinčevo belo (ki vsebuje le cerrusite), kalcit, sadro, ogljikovo črno in indigo. Slednji je pigment organskega izvora, ki je bil uporabljen že od antike, razmah pa je v Evropi doživel v 17. in 18. stoletju (Eastaugh idr., 2004: 205).

Z analitskimi metodami smo opazili tudi materiale, ki predstavljajo kemično povezavo med pigmenti in produkti razgradnje veziv. Najpogostejši so kalcijev oksalat in različni karboksilati (mila različnih pigmentov z maščobnimi kisljinami iz sušljivega olja).

Konservatorsko-restavratorski posegi na lesenih polikromiranih plastikah Jožefa Strauba

Lesena polikromirana plastika z velikega oltarja iz cerkve sv. Jožefa v Studencih (danes v Pokrajinskem muzeju v Mariboru)

Že v preteklosti, v šestdesetih in sedemdesetih letih 20. stoletja so se na leseni polikromirani plastiki iz Studenc izvajala konservatorsko-restavratorska dela. Takrat so kipom dodali veliko manjkajočih delov teles, predvsem prstov in angelskih kril. Pozlata je bila na vseh lesenih plastikah na več mestih odrgnjena do polimenta. Dopolnjeni deli pozlate so bili na prehodu med staro in novo pozlato dokaj vidni, saj so ob polaganju zlatih lističev pustili ostre linije nove pozlate. Na nekaj delih inkarnatov smo med odstranjevanjem preslikav zasledili poskuse odstranjevanja preslikave pri prejšnjem restavriranju, pri katerih se je preslikava skupaj s prvotno poslikavo odluščila od klejne izolacije na kredni podlogi. Zaradi prepričanja, da na kipih ni prvotne poslikave, so v celoti preslikali inkarnate. Med sondiranjem plasti poslikav smo ugotovili, da se pri zmečanju barvne plasti, preslikave lepo ločijo od prvotne poslikave, ta pa ostane prilepljena na zelo gladko klejno izolacijo. Sondiranje smo izvedli na več delih štirih lesenih plastik (*Upanje, Ljubezen in dva angela adoranta*) in prišli do ugotovitve, da je na plastikah ostalo več kot 80 % prvotne poslikave, ki je skupaj s kredno podlogo v dobrem stanju. Sklicali smo interno komisijo, ki je odločila, da na lesenih plastikah odstranimo vse preslikave in jih predstavimo v prvotnem videzu.

Preslikave smo odstranjevali s polarnim surfaktant gelom, izdelanim iz 80 ml acetona, 24 ml benzil alkohola, 4 ml

Ethomeen C-25, 1 g Carbopol EZ 2 in nekaj ml destilirane vode. Gel smo nanašali prek Japan papirja¹, ga pustili delovati 20 minut in nato zmečano plast preslikav odstranili mehansko s skalpelom, očistili z acetonom in nevtralizirali s Shellsolom-T. Ko smo odstranili preslikave, so na posameznih delih plastik ostale temne plasti vezane umazanije na prvotni polikromaciji. Po testiranjih raznih pufrov s pH-ji od 5 do 8 in voščenim milom² smo prišli do zaključka, da se tanjša plast umazanije najbolje odstranjuje s klasično mešanico topil 50 ml acetona, 50 ml etanola, 50 ml 25 % amonijaka in 50 ml destilirane vode. Debelejše plasti trdovratne umazanije smo odstranjevali z nanosom voščenega mila preko Japan papirja in z izdatnim izpiranjem s Shellsolom-T. Na polikromaciji nekaterih lesenih plastik so bili med preslikavami in prvotno poslikavo posamezni deli poslikani s tempero. To smo odstranjevali z mešanico triamonijevega citrata. Pozlato smo očistili z emulzijo (20 ml Brij L4, 50 ml destilirane vode, 450 ml 2,2,4-trimetilpentan). Pri eni od prejšnjih renoviranj so notranjosti gub draperije, ki niso bile pozlačene premazali s tempero v barvi okra. Za odstranjevanje tega premaza smo uporabili puferno raztopino (citrata pH 5,5).

Leseni nosilec smo lokalno utrjevali s 5-15% raztopino akrilne smole Paraloid B72³ v toluenu. Odstopajočo kredno podlogo smo utrjevali s 50% vodno disperzijo akrilnega kopolimera⁴. Poškodbe lesenega nosilca smo zapolnili z dvokomponentno epoksidno maso⁵. Manjkajočo kredno podlogo smo dopolnjevali s premazi akrilne kredne podloge. Pripravili smo dve akrilni podlogi, eno močnejšo in drugo mehkejšo za pozlato. Za prva dva nanosa smo uporabili kredno podlogo, ki je vsebovala 25% akrilno emulzijo⁶ in kalcijev karbonat ali ti. bolonjsko kredo⁷. Za naslednje nanose smo uporabili kredno podlogo, ki je bila izdelana iz 20% akrilne emulzije in kalcijevega disulfata oz. lahke bolonjske krede⁸. Pred nanosi krednih podlog smo površine, na katerih je bilo potrebno dopolniti manjkajočo kredno podlogo izolirali z 20% disperzijo akrilne smole⁹. Poseben problem dopolnjevanja kredne podloge se je pojavil na lesenih polikromiranih plastikah puttov. Na več delih je v zelo majhnih kosih (v velikosti od 2 do 5 mm) odpadla poslikava skupaj s kredno podlogo. Te manjkajoče dele bi bilo dokaj težko dopolnjevati z nanosom tekoče kredne podloge

1 Japan papir - tanek, močan papir, izdelan iz rastlinskih vlaken, dobavitelj Samson Kamnik

2 Topilo na osnovi destilirane vode, beljenega čebeljega voska in amonijevega karbonata.

3 Paraloid™ B 72, dosegljivo pri Kremer Pigmente, GmbH & Co.KG

4 Lascaux® Medium for Consolidation, proizvajalec Lascaux Colours & Restauro

5 Araldit HV+ Araldit SV, dobavitelj Samson Kamnik

6 Primal® AC35, dostopno pri Kremer Pigmente GmbH & Co.KG

7 Chalk from Bologna, dostopno pri Kremer Pigmente GmbH & Co.KG

8 Chalk from Bologna- light, dostopno pri Kremer Pigmente GmbH & Co.KG

9 Lascaux®Hydro Ground, proizvajalec Lascaux Colours & Restauro

s čopičem, zato smo izdelali emulzijski kit, pri čemer smo uporabili akrilno emulzijo in bolonjsko kreda ter izdelali gosto maso. Maso smo nanašali s kovinskimi modelirkami in ga po sušenju obdelali z skalpelom ter omočenimi vatiranimi tamponi.

Dopolnjevanje manjkajoče pozlate in retušo poškodovane pozlate smo izvajali v vodni tehniki na rdeč poliment, ki smo mu dodali 5% ribji klej¹⁰. Na dele, ki so bili zakitani s kredno podlogo, smo polagali zlate lističe. Pri izbiri odenka zlata smo se poskušali čim bolj približati pozlati na lesenih plastikah.¹¹ Ostre linije med novo položenimi zlatimi lističi in staro pozlato smo zmehčali s pomočjo vatiranih tampov. Manjše poškodbe na pozlati smo retuširali z zlatom v prahu, ki smo mu dodali 10% koncentracijo vodotopnega veziva.¹² Zlate lističe in zlato retušo smo spolirali z ahatom. Retušo smo izvajali v dveh fazah. Pri prvi fazi smo monokromatično podložili predhodno zakitane in dopolnjene dele podloge. Za podlaganje smo uporabili vezivo iz akrilne smole in pigmente v prahu,¹³ s katerimi smo se poskušali barvno približati prvotni podlogi. Retušo smo izvajali z barvami na osnovi aldehidne smole,¹⁴ ki smo jo omakali v etil-laktatu. Retušo smo izvajali na način polaganja črtic, s katerimi smo skušali slediti potezam čopiča in smeri nanosov barve.

Lakiranje je zaključna faza konservatorsko-restavratorskih posegov. Pri izbiri laka smo upoštevali predhodno uporabo materialov med posameznimi konservatorsko-restavratorskimi posegi in dejstvo, da je bila prvotna polikromacija lakirana. Odločili smo se za uporabo laka iz akrilnega polimera. Informacije o sijaju prvotnega laka so bile izgubljene, zato smo bili mnenja, da bi bil pol sijajni lak primeren za končni videz poslikave na lesenih plastikah. Lak smo nanašali z mehкими čopiči v dveh slojih, pri čemer se je pred nanosom drugega premaza prvi premaz sušil 24 ur.

Leseni polikromirani plastiki iz cerkve sv. Danijela v Štanjelu

Leseni polikromirani plastiki sv. Janeza Nepomuka in sv. Jožefa z Jezusom sta bili v izjemno slabem stanju. Leseni nosilec je bil močno poškodovan zaradi delovanja lesnega hrošča, imenovanega *Navadni trdoglavec* (*Annobium punctatum*) in bele, ti. korozijske trohnoobe. V lesenem nosilcu

10 Polishing Paste Lefranc® Red, proizvajalec Lefranc & Bourgeois ribji klej, dobavitelj Samson Kamnik

11 Rosenoble Doppel Gold, 23,75 karat, 80x80 mm, dobavitelj Samson Kamnik

12 Zlato v prahu: Rosenoble Pudergold, vezivo: Gummi Arabicum, dobavitelj Samson Kamnik

13 Lascaux Medium Matt, proizvajalec Lascaux Colours & Restauropigmenti v prahu, dostopno pri Kremer Pigmente GmbH & Co.KG

14 GAMBLIN Conservation Colors, dostopno pri Kremer Pigmente GmbH & Co.KG.

so bili še vedno prisotni lesni insekti, kar se je videlo po svežih kupčkih prahu, ki je padel iz izletnih luknjic insektov. Lesene plastike so bile prebarvane v pastoznih monokromih monokromatičnih premazih. Premazane so bile tudi poškodbe lesenega nosilca in mesta manjkajočih delov lesenih plastik.

Zaradi učinkovitejše dezinsekcije smo v prostore Restavratorskega centra v Ljubljani prepeljali vse štiri lesene plastike z glavnega velikega oltarja. Izdelali smo nepredušno komoro, izdelano po meri lesenih plastik in izvedli anoksi postopek zaplinjevanja, pri čemer smo v komoro dovajali dušik. Celoten postopek je trajal osem tednov.

Na vseh štirih lesenih plastikah smo izvedli sondiranje plasti poslikav, pri čemer smo ugotovili, da so bile lesene plastike večkrat premazane z monokromimi monokromatičnimi oljnimi premazi v sivkastih tonih. Pod oljnimi premazi je plast polirane bele, pod njo pa polikromacija s pozlato in posrebitvijo z barvnimi lazurami. Lesene plastike so bile v celoti polakirane z lakom, ki je topen v polarnih topilih. Leseni plastiki Jožefa Strauba imata pod polikromacijo še eno barvno poslikavo, ki pa je slabše ohranjena. Med obema polikromacijama ni zaščitnega laka, zato se poslikavi med seboj težje ločita. Pozlata in posrebitev Na Straubovih lesenih plastikah sta dve plasti pozlate. je samo ena, prvotna.

Začetnemu sondiranju je sledilo odstranjevanje preslikav. Za odstranjevanje pastoznih oljnih poslikav smo uporabili mešanico topil 24 ml 1,3 dioksolan, 80 ml acetona, 4 ml Ethomeena C-25, 1g Carbopola EZ 2 in nekaj ml destilirane vode. Želirana topila smo nanесли na površine preslikav, ga pokrili s PVC folijo in pustili delovati 2 uri. Oljne plasti so se zmehčale, na nekaterih mestih se je zmehčala tudi polirana bela. Zmehčane premaze smo zlahka odstranili z skalpelom, nato smo površino nevtralizirali s Shellsolom-T. Na nekaterih področjih je ostal sloj polirane bele, ki smo ga odstranili z zgoščenim acetonom.¹⁵ Dele draperij svetnikov, ki so zlatene in srebrenе smo najbolje očistili preslikav s toplotnim grelnikom. Vroč zrak, ki je pihal skozi majhno šobo je zmehčal plasti preslikav, kovinsko plast pa ohranil nepoškodovano. Tak način odstranjevanja plasti preslikav se je na vodni pozlati in srebrni pokazal za najprimernejšega. Ostalih površin na lesenih plastikah ni bilo mogoče čistiti z vročim zrakom, saj se je skupaj s preslikavami mehčala tudi polikromacija z zaščitnim lakom.

V določeni fazi odstranjevanje preslikav ni bilo več mogoče, saj je bil leseni nosilec pod kredno podlogo v tako slabem stanju, da ni imel nobene trdnosti. Leseni nosilec plastik je bilo potrebno pred nadaljnjimi posegi leseni vsaj delno utrditi. V tej fazi smo se odločili za utrjevanje hrbtišča lesenih plastik. Pod tanko skorjo na površju se je leseni nosilec dobesedno uprašil na več delih lesene plastike. Prah smo odstranili kolikor je bilo mogoče in s tem omogočili

15 V 100 ml acetona smo dodali 1g Klucela H, zmešali in počakali, da mešanica nabrekne.

boljše prodiranje utrjevalca v notranjost lesa. Na nekaterih mestih plastik smo s hrbtišča proti licu v leseni nosilec zavrtali luknje premera 8 mm, skozi katere smo dovajali utrjevalno sredstvo. Utrjevali smo z akrilnimi smolami v dveh fazah. V prvi fazi smo obdelovane površine omočili s 5% raztopino ogljikovodikove smole¹⁶ v Shellsolu-A, sledilo je utrjevanje z akrilno smolo¹⁷ v toluenu, kateri smo postopoma zviševali koncentracijo od 10-25%. Močnejšo koncentracijo utrjevalca v topilu smo uporabili proti koncu postopka na najbolj oslabljenih delih lesenega nosilca. Ko smo na poškodovanem lesenem nosilcu z utrjevanjem dosegli želeno trdnost, je sledilo kitanje poškodb in domodelacija posameznih manjkajočih delov nosilca. Kitajli smo v dveh fazah in sicer smo v prvi fazi uporabili dvokomponentno epoksidno smolo¹⁸, s katero smo zapolnjevali večje poškodbe v lesu. V predhodno izvrtane luknje smo potisnili epoksidni kit, nato pa vstavili lesene palčke debeline 8 mm, ki so konstrukcijsko ojačile leseni nosilec. Kitajje z epoksidnim kitom smo zaključili nekaj milimetrom pod nivojem. V drugi fazi kitanja smo uporabili dvokomponentno epoksidno pasto,¹⁹ ki smo jo obarvali s pigmenti v prahu, da smo se čim bolj približali barvi lesa. Postopek utrjevanja lesenega nosilca na hrbtišču plastike smo zaključili z obdelavo zakitanih delov. Saniran leseni nosilec je dobil nazaj svojo trdnost, zato smo lahko nadaljevali z odstranjevanjem preslikav.

Veliki oltar sv. Areha iz cerkve sv. Areha na Pohorju

Prve posege na velikem oltarju smo izvedli v začetku meseca maja 2018, po predhodnem ogledu cerkve, ko smo videli oltar v presenetljivo slabem stanju. V cerkvi se je nakopičilo toliko vlage, da so bila kamnita tla popolnoma mokra, kamniti nagrobnik, stene in leseno hrbtišče oltarja je pokrivala tanka plast zelenih alg. Na oltarju se je polikromacija skupaj s kredno podlogo dvigovala, konkavno vihala in odstopala od lesenega nosilca. Da bi preprečili odpadanje in izgubo dragocene polikromacije smo preko Japan papirja s čopičem nanесли medij za utrjevanje. Pri izbiri utrjevalca kredne podloge s polikromacijo smo se namesto običajne uporabe ribjega kleja odločili za akrilni kopolimer.²⁰ Pozno jeseni smo odšli na Areh z namenom demontaže lesenih plastik in manjših delov visokega oltarja. Po postavitvi delovnih odrov in pogledu na stanje oltarja od blizu smo se odločili, da oltar v celoti razstavimo in ga odpeljemo v restavratorski atelje Restavratorskega centra v Ljubljani. Kredna podloga s polikromacijo je bila po celotni površini

16 Regalrez™ 1126, proizvajalec Eastman Chemical Company

17 Paraloid™ B 72, dosegljivo pri Kremer Pigmente, GmbH & Co.KG

18 Araldit HV, Araldit SV, dosegljivo pri Samson Kamnik

19 Woody-wood repairing and restoring paste, proizvajalec Samson Kamnik

20 Lascaux®Medium for Consolidation

oltarja v slabem stanju. Na več področjih lesenih plastik in arhitekture je lomljiva podloga razpokala in konkavno odstopila od lesenega nosilca. Take poškodbe je poleg dejstva, da so v cerkvi skozi vse leto nizke temperature, težko kvalitetno sanirati *in situ*. Prvi posegi, ki smo jih na razstavljenih delih in lesenih plastikah z oltarja izvedli so bili zaščita odstopajoče polikromacije in dezinfekcija lesenega nosilca na hrbtiščih.

Hrbtišča lesenih plastik in sestavnih delov oltarja smo mehansko s čopiči in nato še mokro s krpami očistili umazanije in zelenih alg. Ko se je leseni nosilec osušil, smo nanj brizgali oziroma ga premazali z brezbarvnim zaščitnim pripravkom²¹, ki ščiti les pred delovanjem lesnih insektov in lesnih gliv. Leseni nosilec visokega oltarja je v dobrem stanju. Zaradi stalno prisotne visoke vlage in nizkih temperatur ni bil ugoden gostitelj lesnih insektov. Smo pa na hrbtišču lesene plastike sv. Janeza Nepomuka našli poškodbe lesa, nastale zaradi procesa razkroja lesa v času rasti (t.i. izvotlitev lipe). delovanja kletne gobe, ki pa so jo v preteklosti izsušili, saj na površini ni vidnih rizomorf. V spodnjem delu obhodnih niš je leseni nosilec močno poškodovan zaradi delovanja rjave trohnoobe. Kljub temu, da je glavnina lesenega nosilca oltarja v dobrem stanju, smo ob podrobnem pregledu stanja ugotovili, da manjka precej večjih in manjših delov oltarja. Zaradi visoke vlage v cerkvi je klejno lepilo, ki so ga uporabljali za lepljenje lesa, sčasoma popustilo, sestavni deli lesenih plastik, arhitekturnega dela in okrasja so odpadli in se izgubili. Obe roki sv. Frančiška Ksaverija so v preteklosti iz nam neznanega vzroka odžagali v predelu zapestja, kar se opazi po sledih uporabe orodja na lesenem nosilcu.

Ker je bila konkavno privzdignjena odstopajoča kredna podloga izredno lomljiva, smo debele plasti prahu previdno odstranili z mehкими čopiči. Na manjše področje odstopajoče kredne podloge smo položili Japan papir, preko katerega smo nanašali 50% koncentracijo utrjevalca- akrilnega kopolimera. Japan papir je preprečil odpadanje kredne podloge, ko smo jo z nanosom utrjevalca omočili in s čopičem nežno potisnili nazaj na leseni nosilec. Termoplastično utrjevalno sredstvo smo aktivirali z grelnimi lopaticami in tako s pritiskom ter temperaturo povezali oslABLJENE dele slikovnih plasti s podlogo in lesenim nosilcem. Prilepljene lističe smo s polikromacije odstranili s pomočjo toplote.

Po končanem postopku ravnanja in utrjevanja kredne podloge s poslikavo smo na posameznih elementih oltarja izvedli sondiranje plasti poslikav. Rezultati sondiranja so pokazali, da je bil oltar v preteklosti najmanj štirikrat obnovljen, večinoma zato, da so prekrili mesta, kjer je odpadla kredna podloga s poslikavo. Prvotna polikromacija arhitekture oltarja je bil v tehniki tempere naslikan marmorino. Pri prvem posegu so čez vse površine na licu

21 Silvanol®, proizvajalec Silvaprodukt Ljubljana in Borosol, proizvajalec Regeneracija Lesce. Obe zaščitni sredstvi sta na vodni osnovi in vsebujeta visok delež borovih soli.

oltarja nanesti tanek sloj klejno kredne podloge in nanjo v tehniki tempere naslikali marmorino. Draperije lesenih plastik, ki so bile prvotno zlatene in srebrenne v vodni tehniki z rdečimi in zelenimi lazurami, so premazali z rdečo in zeleno tempero. Sledili sta še dve preslikavi z oljnimi barvnimi premazi, ki sta na arhitekturi oltarja zopet imitirali marmor. Zadnja, danes vidna poslikava visokega oltarja bi lahko slogovno uvrstili v začetek 20. stoletja. Na več sestavnih delih oltarja in rezljanem okrasju med sondiranjem nismo našli prvotnih plasti kredne podloge in poslikave. Tudi glavni svetnik sv. Areh ima zgolj eno plast kredne podloge z eno poslikavo oziroma pozlato. Smo pa v glavni niši pod štirimi plastmi poslikave odkrili poslikavo v tehniki tempere, ki imitira rdeč marmorino. Na inkarnatih lesenih polikromiranih plastik smo našli od dve do največ štiri plasti poslikave.

Glede na rezultate sondiranja, bo potrebno za odločitev o končnem videzu polikromacije oltarja sklicati strokovno komisijo, ki se bo na podlagi zbranih dejstev in izkušenj odločila, v katero smer naj potekajo konservatorsko-restavratorski posegi.

Zaključek

Analize slikovnih slojev lahko podajo številne informacije o tehnologiji prvotnih in kasnejših polikromacij analiziranih kipov. Na podlagi rezultatov analiz smo tako lahko nekatere polikromacije umestili med prvotne, druge pa kot kasnejše posege. Nekatere posege smo lahko tudi okvirno časovno umestili. S tem smo dodali nekaj informacij k zgodovini analiziranih kipov, za katero ne obstajajo pisni viri. Na Oddelku za les imamo istočasno tri različna dela istega avtorja, s tremi različnimi restavratorskimi pristopi. Končni rezultat konservatorsko-restavratorskih posegov na lesenih plastikah iz Pokrajinskega muzeja v Mariboru je prezentiranje prvotne polikromacije z retušo in rekonstrukcijo manjkajočih delov poslikave. Strokovna komisija je pri vprašanju končnega videza lesenih plastik iz Štanjela določila, da se na dveh plastikah, ki sta delo Jožefa Strauba odstranijo številne barvne plasti do prve preslikave, pod katero je na določenih mestih še ohranjena prvotna poslikava. Pri visokem velikem oltarju sv. Areha so problematični številni posegi v preteklosti in le delno ohranjena prvotna polikromacija in pozlata oz. posrebitev z barvnimi lazurami.

Viri in literatura

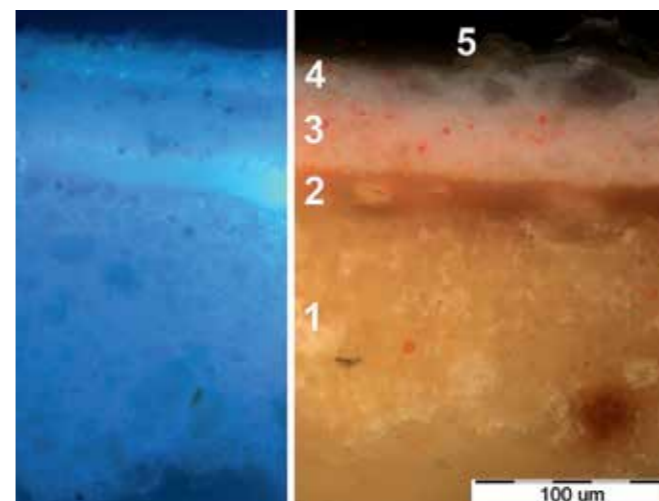
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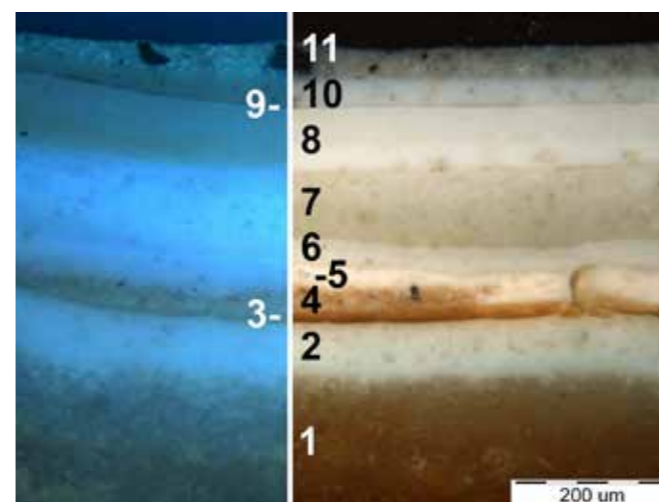
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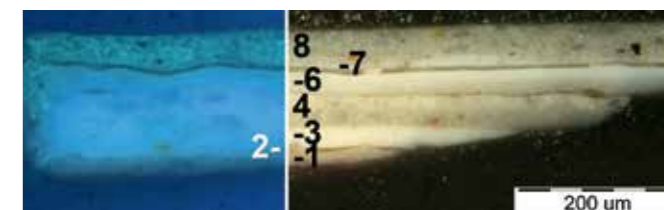
1. Fotografija prečnega preseka vzorca inkarnata s kipa angela (STJ015) v ultravijolični (UV, levo) in vidni svetlobi (VIS, desno). S številkami so označeni posamezni sloji: 1- podloga; 2- proteinski premaz; 3- prvotna barvna plast inkarnata; 4- kasnejši sloj inkarnata; 5- premaz/ lak (foto: Katja Kavkler).

1. Photo of the cross-section of the carnation sample from the angel sculpture (STJ015) in ultraviolet (UV, left) and visible light (VIS, right). Numbers indicate the individual layers: 1 - ground layer; 2 - protein coating; 3 - original colour carnation; 4 - later carnation layer; 5 - coating / varnish (photo: Katja Kavkler).



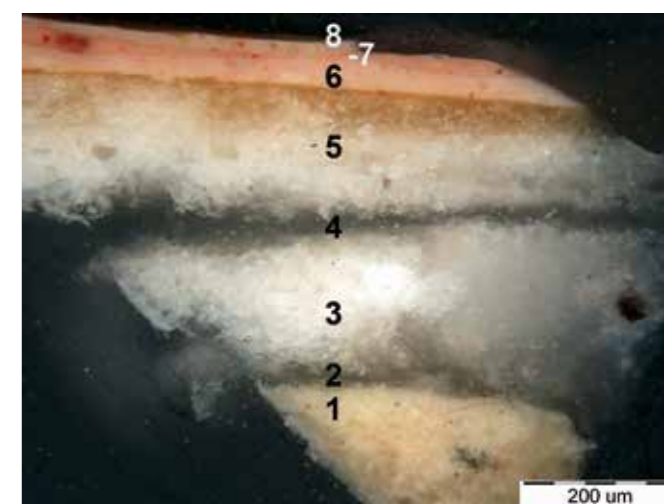
2. Prečni presek vzorca odvzetega s kipa Sv. Jožef z detetom iz cerkve sv. Danijela v Štanjelu (STJ013) v UV in VIS, kjer vidimo 11 slojev slikovnih plasti, nanesenih v vsaj 5 različnih posegih (foto: Katja Kavkler).

2. Cross-section of the sample from the sculpture of St. Joseph with Child from the Church of St. Daniel in Štanjel (STJ013) in UV and VIS, showing 11 paint layers applied during at least 5 separate interventions (photo: Katja Kavkler).



3. Prečni presek vzorca odvzetega z inkarnata sv. Gregorja iz cerkve sv. Danijela v Štanjelu (GRE). Sloj 1 je najstarejši inkarnat, nad katerim vidimo več slojev monokromatskih preslikav (foto: Katja Kavkler).

3. Cross-section of the carnation sample from the sculpture of St. Gregory from the Church of St. Daniel in Štanjel (GRE). Layer 1 is the oldest carnation layer, covered with several monochromatic overpaint layers (photo: Katja Kavkler).



4. Prečni presek vzorca odvzetega z inkarnata Janeza Krstnika s stranskega oltarja v cerkvi sv. Mihaela v Črešnjevcu (STJ021). Vidimo več slojev podlog, ločenih sloji izolacije. Spodnji sloj podloge (sloj 1) je verjetno prvoten, ostali sloji pa so bili naneseni med kasnejšimi posegi.

4. Cross-section of the carnation sample from the sculpture of St. John the Baptist from the side altar of the Church of St. Michael in Črešnjevce (STJ021). Shown are several ground layers, separated by isolation layers. The lower ground layer (layer 1) is probably the original one, while other layers were applied during later interventions.



5. Maribor, Pokrajinski muzej Maribor, del zbirke polikromiranih lesenih plastik z nekdanjega oltarja v cerkvi sv. Jožefa v Studencih, po konservatorsko-restavratorskih posegih (foto: Valentin Benedik)

5. Maribor, Maribor Regional Museum, part of the collection of polychromed wooden sculptures from the former altar of the Church of St Joseph in Studenci, after the conservation-restoration interventions (photo: Valentin Benedik)



6. Maribor, Pokrajinski muzej Maribor, del zbirke polikromiranih lesenih plastik z nekdanjega oltarja v cerkvi sv. Jožefa v Studenci, po konservatorsko-restavratorskih posegih, razen kipov Boga Očeta in keruba desno zgoraj (foto: Valentin Benedik)
6. Maribor, Maribor Regional Museum, part of the collection of polychrome wooden sculptures from the former altar of the Church of St Joseph in Studenci, after the conservation-restoration interventions – except the sculptures of God the Father and the cherub (photo: Valentin Benedik)



7. Maribor, Pokrajinski muzej Maribor, detajl polikromirane lesene plastike angela adoranta po konservatorsko-restavratorskih posegih (foto: Valentin Benedik)
 7. Maribor, Maribor Regional Museum, detail of the polychromed wooden sculpture of the adoring angel, after the conservation-restoration interventions (photo: Valentin Benedik)



8. Maribor, Pokrajinski muzej Maribor, detajl lesene polikromirane plastike, kerub med postopkom odstranjevanja preslikav (foto: Valentin Benedik)
 8. Maribor, Maribor Regional Museum, detail of the polychromed wooden sculpture of the cherub, during the removal of overpaint layers (photo: Valentin Benedik)



9. Štanjel, ž. c. sv. Danijela, polikromirana lesena plastika sv. Jožefa z Jezusom pred konservatorsko-restavratorskimi posegi (foto: Valentin Benedik)
 9. The polychromed wooden sculpture of St Joseph with Child from the Church of St Daniel in Štanjel, before conservation-restoration interventions (photo: Valentin Benedik)



10. Štanjel, ž. c. sv. Danijela, polikromirana lesena plastika sv. Janeza Nepomuka pred konservatorsko-restavratorskimi posegi (foto: Valentin Benedik)
 10. The polychromed wooden sculpture of St John of Nepomuk from the Church of St Daniel in Štanjel, before conservation-restoration interventions (photo: Valentin Benedik)



11. Štanjel, ž. c. sv. Danijela, polikromirana lesena plastika sv. Janeza Nepomuka po odstranitvi monokromatskih preslikav (foto: Valentin Benedik)
 11. The polychromed wooden sculpture of St John of Nepomuk from the Church of St Daniel in Štanjel, after the removal of the monochromatic overpaint layers (photo: Valentin Benedik)



12. Štanjel, ž. c. sv. Danijela, detajl polikromirane lesene plastike sv. Jožefa z Jezusom po odstranitvi monokromatskih preslikav (foto: Valentin Benedik)
 12. Detail of the polychromed wooden sculpture of St Joseph with Child from the Church of St Daniel in Štanjel, after the removal of the monochromatic overpaint layers (photo: Valentin Benedik)



13. Areha, c. sv. Areha na Pohorju, polikromiran lesen oltar sv. Areha pred demontažo in konservatorsko-restavratorskimi posegi (foto: Valentin Benedik)
 13. The polychromed wooden high altar of St Henry from the Church of St Henry in Areha na Pohorju, before disassembly and conservation-restoration interventions (photo: Valentin Benedik)



14. Areh, c. sv. Areha, detajl polikromirane lesene glavice putta pred konservatorsko-restavratorskimi posegi (foto: Valentin Benedik)
14. Detail of the polychromed wooden sculpture of a putto from the Church of St Henry in Areh, before conservation-restoration interventions (photo: Valentin Benedik)



15. Areh, c. sv. Areha, detajl oltarnega podstavka med postopkom odstranjevanja preslikav (foto: Valentin Benedik)
15. Detail of the altar base from the Church of St Henry in Areh, during the removal of overpaint layers (photo: Valentin Benedik)

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Jožef Straub in Slovenia, research and conservation-restoration interventions

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Abstract

At the wood department of the Restoration Centre of the Institute for the Protection of Cultural Heritage of Slovenia (IPCHS) we first encountered the works by Jožef Straub in 2015. As part of a regular programme, financed by the Ministry of Culture of the Republic of Slovenia, we transferred four polychromed wooden sculptures to the Restoration Centre workshop; once part of the high altar in the church in Studenci, these sculptures are presently displayed in the open storage of the Maribor Regional Museum. Between 2015 and 2018, we carried out work on the following polychromed wooden sculptures: *Faith, Hope and Love, two adoring angels, a cherub, two angel heads, three putti, and two cherubs from the lintel of the altar.*

As part of the *TrArS* project, we carried out field inspections of Straub's works in two churches. We found badly damaged artworks and transferred them to the workshop of the IPCHS Restoration Centre in Ljubljana to prevent their further degradation. These works include two polychromed sculptures from the Church of St Daniel in Štanjel, representing St John of Nepomuk and St Joseph with Child, and the high altar of St Henry from the Church of St Henry in Frajnhajm (Areh na Pohorju).

The sampling of all colour and metal layers for scientific examination allowed us to obtain, together with the probing of paint layers, valuable data on materials, as well as earlier interventions and modifications.

Microscopic and spectroscopic analyses of paint layers on wooden polychromed sculptures by Jožef Straub

In the course of the *TrArS* project, we had the opportunity to analyse a number of sculptures by Jožef Straub. Among them were the high altar of the Church of St Joseph in Studenci (Maribor) from 1750, preserved at the Maribor Regional Museum, from which we analysed nine paint layers of the *putti* and angels (STJ003 to STJ011); St Joseph with Child (STJ013) and St John of Nepomuk (STJ014) from the Church of St Daniel in Štanjel; the side altar of St Lucy from the Church of the Virgin Mary in Podlehnik (STJ017); the altar of Mary (STJ018) and the pulpit (STJ019) from the Church of St Margaret in Selnica ob Dravi; the sculpture of God the Father (Creator) from the museum in the library of the Minorite Monastery in Ptuj (STJ020); the side altar from the Church of St Michael in Črešnjevca (Slovenska Bistrica Municipality; STJ021); and the high altar of St Henry from the Church of St Henry in Areh na Pohorju (STJ022). The samples from sculptures in the Church of St Daniel in Štanjel (STJ013 and STJ014) were compared with those from the sculpture of St Gregory, by an unknown author, located in the same church (GRE). All examined works are listed in Table 1, together with working designations that help us

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guide further research and referencing of the results.

In the course of the investigations, we analysed the oldest paint layers, as well as some of the overpaints. This allowed us to obtain data on both the original layers and subsequent modifications. However, since paint layers were often fully stripped from the sculptures during renovations, we could not always ascertain if the oldest layers are indeed the original ones.

Table 1 :

| Working designation | Object | Title | Location | Dating |
|---------------------|---|---|--|----------------------|
| STJ003 | Statue "Angel with Grapevine" | Maribor Regional Museum (altar in Studenci) | Maribor | 1750 |
| STJ004 | Statue "Angel with Ears of Wheat" | Maribor Regional Museum (altar in Studenci) | Maribor | 1750 |
| STJ005 | Statue "Love" | Maribor Regional Museum (altar in Studenci) | Maribor | 1750 |
| STJ006 | Statue "Hope" | Maribor Regional Museum (altar in Studenci) | Maribor | 1750 |
| STJ007 | Statue "Putto with a Book" | Maribor Regional Museum (altar in Studenci) | Maribor | 1750 |
| STJ008 | Statue "Putto", inv. no. N 468 | Maribor Regional Museum (altar in Studenci) | Maribor | 1750 |
| STJ009 | Statue "Hope" | Maribor Regional Museum (altar in Studenci) | Maribor | 1750 |
| STJ010 | Statue "Angel" | Maribor Regional Museum (altar in Studenci) | Maribor | 1750 |
| STJ011 | Statue "Putto", inv. no. N 13930 | Maribor Regional Museum (altar in Studenci) | Maribor | 1750 |
| STJ013 | Statue "St Joseph with Child" | The Church of St Daniel | Štanjel | 1741 |
| STJ014 | Statue "St John of Nepomuk" | The Church of St Daniel | Štanjel | 1741 |
| STJ015 | Statue "Angel 1" | Maribor Regional Museum (altar in Studenci) | Maribor | 1750 |
| STJ016 | Statue "Angel 2" | Maribor Regional Museum (altar in Studenci) | Maribor | 1750 |
| STJ017 | The side altar of St Lucy | The Church of the Virgin Mary | Podlehnik | 1752 |
| STJ018 | The altar of Mary in the chapel | The Church of St Margaret | Selnica ob Dravi | 1750 |
| STJ019 | The pulpit | The Church of St Margaret | Selnica ob Dravi | 1750 |
| STJ020 | Statue "The Creator", a.k.a. "God the Father" | The museum in the library of the Minorite Monastery in Ptuj | Ptuj | 1752 |
| STJ021 | The side altar | The Church of St Michael | Črešnjevec, Municipality of Slovenska Bistrica | |
| STJ022 | The high altar of St Henry | The Church of St Henry | Frajhajn, Areh na Pohorju | 1756 |
| GRER | Statue "St Gregory" | The Church of St Daniel | Štanjel | 18th or 19th century |

List of the examined objects with working designations.

Methodology

The analyses were focused on the use of materials and techniques and the application of paint layers (stratigraphy). To obtain as complete a record of stratigraphy as possible, all sample cross-sections were first examined under an optical microscope. This allowed us to establish the layer sequence, identify those that are likely original, and determine the number of modifications. Selected samples were then further examined with a Raman spectrometer to identify pigments and fillers in paint layers. Lastly, we used an infrared spectrometer (FTIR) to attempt the identification of organic matter (binders and surface coatings), as well as to obtain data on inorganic materials and the presence of various products of pigmentation decay (e.g. calcium oxalate and carboxylates or soaps).

Analyses and discussion of results

During the analyses of the angels and *putti* from the altar of the church in Studenci, we focused on the composition of the carnation and hair layers, as well as metal layers covering the drapery and skirts. We determined that the ground layer beneath the colour layers was made from calcite, which was also mixed with aragonite and silicates (e.g. kaolinite) in some samples. Ground layers contained protein binders, but we were unable to determine their origin with the FTIR spectrometer, since proteins from various sources (animal glue, casein, egg white and yolk) show very similar spectra that are impossible to distinguish due to the chemical effects of ageing and the absorption bands of other materials in the spectrum. The same ground was also used in areas that were surface-coated with metals (gilding, sil-

vering), except in the case of two angel sculptures (STJ015 and STJ016) where the ground beneath the metal application is made from gypsum with protein binder. This might indicate a different manufacturing technology, although it is more likely that the layer in question is not the original surface treatment. In most examined areas, an isolation layer of protein binder, probably animal glue (Figure 1), separates the ground layer from the carnation and hair layers above it. The oldest colour layers in the samples from the altar in Studenci were applied in one or two coats of paint that used drying oil as binder. Carnations were coloured with a mixture of lead white and cinnabar, which were the most common pigments for their respective colours in the Baroque period (Koller, 1997: 364,367). Where barium sulphate is also present (in sculptures STJ008, STJ015 and STJ016), the colour layers are likely not the original ones, since synthetic barium sulphate was only manufactured in the 19th century (Eastaugh et al., 2004: 46). In the sculpture of a *putti* with book (STJ007) we also identified litharge, a red lead oxide, in addition to cinnabar, while the angel sculpture (STJ016) also contains haematite (iron oxide, a red mineral pigment). We can assume that the latter two colour layers are also not the original ones.

We also analysed the composition of the bole layer on sculptures STJ015 and STJ016. It was made from arsenic sulfide (realgar or pararealgar). The Raman analysis of bole layers on other sculptures did not yield conclusive data, but we can assume they were pigmented with burnt iron oxide. Three sculptures from the Church of St Daniel in Štanjel were also examined. All were repainted white or grey during previous renovations, presumably to give them the appearance of stone. Two of the sculptures – St Joseph with Child (STJ013) and St John of Nepomuk (STJ014) – were created by Straub, while the sculpture of St Gregory (GRE) was made by an unknown 18th or 19th century author. The investigation focused on the original paint layers of the three sculptures, as well as their subsequent modifications. Stratigraphy results revealed 10 to 15 paint layers in all examined samples from the two sculptures by Straub: ground layers, colour layers, coatings, metal layers, etc. (Figure 2) We assume that the oldest layers of sculptures STJ013 and STJ014 are original and were applied by Straub. The grounds were applied twice, first in a layer of calcite, then plaster (gypsum or Bologna chalk), which differs from the sculptures from Studenci. The binder was probably protein in origin. In some samples, the binder appears to have an added fat component (oily tempera). The binder in colour layers is drying oil. The oldest layers are pigmented with lead white, cinnabar, haematite, charcoal black, and what appears to be smalt. As in the altar from Studenci, the two sculptures by Straub also carry a coating layer beneath the carnation, which confirms that these layers are most likely the original ones.

The statue of St Gregory shows fewer layers and was already repainted in monochrome (Figure 3) upon its first

renovation. We can therefore assume it was created at a later date than the works by Straub. The top five layers of all three sculptures are identical: cool white (lead white), warm white (barium sulphate and lead white), two layers of zinc white, and a final grey layer (anatas, barium sulphate, charcoal black). However, the composition of the oldest layers of the sculpture of St Gregory differs from that of Straub's sculptures – most notably in the presence of barium sulphate with lead white, which was not detected in Straub's works.

Since we do not have a full historical account of the analysed sculptures, the analyses of stratigraphy and used materials can help us reconstruct the original polychromy and the chronology of renovations and modifications. This outline can be based on the historic periods in the use of specific materials that were only discovered or adopted after a certain date, or whose use was discontinued at known times in the past. One example is the use of lead white, which was the only white pigment used in painting and polychromed wooden sculptures up until 1835 (Schramm, Hering, 1988: 28). It was then supplanted by white pigments which were better in some regards and, more importantly, were not toxic. Among these is zinc white (zinc oxide), which was adopted for use as a pigment at the end of the 18th century, entered industrial production between 1835 and 1844, and saw a major increase in use after 1845 (Eastaugh et al., 2004: 414). The use of barium sulphate (barite or the permanent white) increased after 1830, when a synthetic analogue became available, mostly used as filler (Eastaugh et al., 2004: 46). In the 20th century, titanium white joined the range of white pigments; today, it is the most common white pigment, extracted initially (from 1918 to 1938) from the mineral anatase and later on from rutile (Eastaugh et al., 2004: 366).

Based on the results of the analyses, we can thus conclude that the St Gregory sculpture was created after 1830, since barium sulphate is already present in the original layers. Not long afterwards, all three sculptures from the Church of St Daniel in Štanjel were overpainted with a mixture of lead and barium white. The coatings of zinc white were applied in the second half of the 19th, or early 20th, century, whereas the top grey layer was added in the interwar period.

We also analysed a number of Straub's sculptures from other churches (STJ017 to STJ022), obtaining one to three samples per individual sculpture, while the high altar from the Church of St Henry (STJ022) was sampled more extensively. The ground layer in all of these works was made with protein binder or oily tempera, while the filler was mostly calcite, with addition of aragonite in the case of the pulpit from the Church of St Margaret in Selnica ob Dravi (STJ019). The samples from the sculpture of God the Father from Ptuj (STJ020) and the side altar from Črešnjevec (STJ021) show gypsum in the top layers, as well as anhydrite in the case of STJ021. In the latter sample, the lower layer of the ground is

calcite (Figure 4). This is probably the only original layer in this sample, since the composition of carnation differs from that seen in Straub's other works.

As was the case with sculptures from Studenci and Štanjel, the signature layer of protein isolation beneath the carnation can also be found on the sculpture of St Lucy from Podlehnik (STJ017). In this sculpture, the material composition of the carnation matches as well, whereas it is different in other works. The protein coating over the ground is not present in the sculptures from the pulpit in Selnica ob Dravi (STJ019) and the side altar in Črešnjevec (STJ021). The same holds for the sculpture of St Paul from the altar of St Henry (STJ022 11), which likely also lacks the original colour layers, as the different material composition of the carnation attests. Namely, the carnation of St Paul's finger also contains the Prussian blue pigment along with cinnabar and lead white; while the former had already been known for around 50 years at the time the altar was created (Eastaugh et al., 2004: 314), it has not been detected in other works by Straub. The possibility exists, however, that the artist adopted a different technology while creating this work.

The marmorino plaster on the altar in Podlehnik (STJ017), made on calcite ground with protein binder, is likely original. The binder in the marbling is protein as well, and the artist utilised lead white (containing only cerussite), calcite, gypsum, charcoal black and indigo to create the marble impression. Indigo is an organic dye that had been used since antiquity and saw a surge in popularity during the 17th and 18th centuries (Eastaugh et al., 2004: 205).

Analytical methods also revealed materials that represent chemical bonds between pigments and the products of binder decomposition. Most common among these are calcium oxalate and various carboxylates (soaps of different pigments with fatty acids from the drying oil).

Conservation-restoration interventions on polychromed wooden sculptures by Jožef Straub

Polychromed wooden sculpture from the high altar of the Church of St Joseph in Studenci (Maribor Regional Museum)

The polychromed wooden sculpture from Studenci already underwent conservation-restoration works in the 1960s and 1970s. At that time, many lost elements of the statues were supplemented, mostly fingers and wings of angels. On all wooden sculptures, gilding has peeled away in places all the way to the poliment layer. The areas of re-gil-

ding were relatively obvious in the transitions between old and new layers, since the subsequent application of gold leaf left sharp lines in the gilding. During the removal of overpaint from parts of the carnation, we traced earlier restoration attempts which resulted in the overpaint layer peeling away, together with the original coat of paint, from the animal glue isolation layer on the chalk ground. In an apparent belief that the statues were originally not painted, the carnations were overpainted in full. During the probing of paint layers, we also established that overpaint, if softened, can be neatly separated from the original coat, which remains attached to the very smooth animal glue isolating layer. We probed several areas of the four wooden sculptures (*Hope, Love and two adoring angels*) and determined that over 80% of their original paint layer is preserved and in good shape, as is the chalk ground. We convened an internal committee, which decided that overpaint layers would be removed from the sculptures in order to restore their original appearance.

Overpaints were removed with a polar surfactant gel, formulated from 80 ml of acetone, 24 ml of benzyl alcohol, 4 ml of Ethomeen C-25, 1 g of Carbopol EZ 2 and a few ml of distilled water. We applied the gel over Japan paper¹, left it to act for 20 minutes, then physically removed the softened overpaint layer with a scalpel, cleaned the area with acetone and neutralised it with the Shellsol-T solvent. After the removal of overpaint, parts of the sculptures were left with dark patches of grime adhering to the original polychromy. After testing different buffers in the range of pH 5 to 8 and wax soap², we concluded that the thinner grime layers could be effectively removed with the solvent mixture of 50 ml of acetone, 50 ml of ethanol, 50 ml of 25 % ammonia and 50 ml of distilled water. Thicker and hardier grime layers were cleaned by applying wax soap over Japan paper and extensive rinsing with Shellsol-T. Parts of the polychromy of some wooden sculptures were painted with tempera in between the overpaints and the original application of colour. This was removed with a solution of triammonium citrate. The gilding was cleaned with an emulsion (20 ml of Brij L4, 50 ml of distilled water, 450 ml of 2,2,4-Trimethylpentane). During one of the previous restorations, the depths of drapery folds that were not gilded were painted with ochre tempera. This coating was removed with a buffer solution (citrate pH 5,5).

The wooden support was locally consolidated with a 5-15% solution of Paraloid B72 acrylic resin³ in toluene. The delaminated chalk ground layer was consolidated with a 50 % aqueous dispersion of acrylic copolymer⁴. Damaged areas

- 1 Japan paper – thin, strong tissue made from vegetable fibres, supplied by Samson Kamnik.
- 2 Solvent based on distilled water, bleached beeswax and ammonium carbonate.
- 3 Paraloid™ B 72, available from Kremer Pigmente, GmbH & Co.KG.
- 4 Lascaux® Medium for Consolidation, manufactured by Lascaux Colours & Restauro.

of the wooden support were infilled with a two-part epoxy putty⁵. Lost chalk ground was supplemented with coatings of acrylic chalk ground. We prepared two acrylic grounds, a hard and a soft one for gilding. For the two initial coatings, we used a chalk ground comprising a 25% acrylic emulsion⁶ and calcium carbonate – the so-called Bologna chalk⁷. For subsequent coatings, we used a chalk ground comprising a 20 % acrylic emulsion and calcium disulphate or light Bologna chalk⁸. Before the coatings were applied, we isolated the surfaces of lost chalk ground with a 20% dispersion of acrylic resin⁹. The supplementation of chalk ground was particularly challenging in the case of the polychromed wooden sculptures of *putti*. In several places, very small flakes of paint (ranging from 2 to 5 mm in size) fell away together with the chalk ground. Since it would be quite difficult to supplement losses by applying liquid chalk ground with a brush, we made an emulsion kit – a dense putty based on acrylic emulsion and Bologna chalk. The putty was applied with metal palette knives, then treated with a scalpel and damp cotton pellets after drying. The supplementation of lost gilding and the retouching of damaged gilding was executed in water technique on red poliment with a 5% fish glue¹⁰. Parts that were infilled with chalk ground were overlaid with gold leaves. In selecting the gold leaf shade, we tried to stay as close as possible to the original colour of the gilding on the sculptures.¹¹ The sharp edges of the newly laid gold leaf on old gilding were smoothed down with damp cotton pellets. Minor damage on the gilding was retouched with gold powder, to which we added a 10% concentration of water-soluble binder.¹² We burnished the gold leaf and retouched areas with agate stone.

Retouching was carried out in two stages. In the first stage, we applied a monochromatic ground layer to areas that were earlier infilled and supplemented. For this application, we used an acrylic resin adhesive and powdered pigments,¹³ which we matched to the colour of the original ground. For the retouching, we used colours based on aldehyde resin,¹⁴ which was wetted with ethyl lactate. Reto-

5 Araldit HV+ Araldit SV, supplied by Samson Kamnik.

6 Primal® AC35, available from Kremer Pigmente GmbH & Co.KG.

7 Chalk from Bologna, available from Kremer Pigmente GmbH & Co.KG.

8 Chalk from Bologna – light, available from Kremer Pigmente GmbH & Co.KG.

9 Lascaux®Hydro Ground, manufactured by Lascaux Colours & Restauro.

10 Polishing Paste Lefranc®Red, manufactured by Lefranc & Bourgeois. Fish glue, supplied by Samson Kamnik.

11 Rosenoble Doppel Gold, 23,75 carat, 80 x 80 mm, supplied by Samson Kamnik.

12 Gold powder: Rosenoble Pudergold, binder: Gummi Arabicum, supplied by Samson Kamnik.

13 Lascaux Medium Matt, manufactured by Lascaux Colours & Restauro. Powdered pigment, available from Kremer Pigmente GmbH & Co.KG.

14 GAMBLIN Conservation Colors, available from Kremer Pigmente GmbH & Co.KG.

uching was executed by applying lines that tried to follow brush strokes and directions of colour application.

The final step of conservation-restoration interventions is varnishing. In selecting varnish, we considered the use of materials in earlier conservation-restoration interventions and the fact that the original polychromy was lacquered. We decided to use an acrylic polymer varnish. Since we had no information on the gloss of the original lacquer, we decided that a semi-gloss varnish would be appropriate for the final appearance of the polychromed sculptures. The varnish was applied with soft brushes in two coats, with a drying period of 24 hours between the applications.

Polychromed wooden sculptures from the Church of St Daniel in Štanjel

The two polychromed wooden sculptures representing St John of Nepomuk and St Joseph with Child were in a very poor condition. The wooden support was badly damaged by the wood-boring furniture beetle (*Anobium punctatum*) and the white, so-called corrosive rot. Wood-boring insects were still present in the support, which was indicated by fresh piles of dust falling from the exit holes. Wooden sculptures were overpainted in pastose monochromatic coatings. Damaged areas of the support and lost parts of the sculptures were coated as well.

All four wooden sculptures from the high altar were transferred to the facilities of the IPCHS Restoration Centre in order to enable effective disinfection. We constructed a custom airtight chamber to the dimensions of the sculptures and carried out anoxic fumigation with nitrogen. The entire procedure lasted eight weeks.

We probed the paint layers on all four wooden sculptures and determined that they were coated several times with monochromatic oil paint in greyish tones. Under the oil paint coatings, there is first a layer of polished white, then the polychromy with gilding and silvering with colour glaze. The wooden sculptures were fully varnished with a lacquer that dissolves in polar solvents. The two sculptures by Straub have another colour paint layer under the polychromy, but it is poorly preserved. Since there is no protective varnish separating the two polychromies, it is difficult to distinguish the two paint layers. The single layer of gilding and silvering on the wooden sculptures is the original one.

The initial probing was followed by the removal of overpaint layers. We used the following mixture of solvents for the removal of pastose oil paint: 24 ml of 1,3-dioxolane, 80 ml of acetone, 4 ml of Ethomeen C-25, 1g of Carbopol EZ 2 and a few ml of distilled water. We applied the gelled solvents to the surface of overpaints, covered them with PVC sheeting and left them to act for two hours. The layers of oil paint softened, as did the polished white layer in some places. Softened coats were easily removed with a scalpel, then the surface was neutralised with Shellsol-T. The polished

white layer persisted in some parts and was removed with concentrated acetone.¹⁵ The use of a heating device proved to be the most efficient means to remove overpaint from the gilded and silvered portions of the Saints' draperies. Heated air blown through a small nozzle softened the overpaint layers while leaving the metal layer intact. This method of overpaint removal proved to be best suited for the water gilded and silvered portions. Other surfaces of the sculptures could not be cleaned in this manner, since heated air softened the polychromy with protective varnish in addition to the overpaint layers.

At a certain point the removal of overpaint layers was no longer possible, since the wooden support beneath the chalk ground was so decayed it lacked structural strength and needed to be at least partially consolidated before any further intervention. We decided to reinforce the back of the wooden sculptures. In several areas, the wooden support had literally turned to dust beneath the thin surface crust. We removed as much dust as possible in order to improve penetration of the consolidant into the wood. In some places, we drilled 8 mm diameter holes into the support from the rear towards front, which were used to inject the consolidating agent. Consolidation was accomplished using acrylic resin in two phases. In the first phase, treated surfaces were wetted with a 5% solution of hydrocarbon resin¹⁶ in Shellsol-A, then consolidated with a solution of acrylic resin¹⁷ in toluen with a gradual increase in concentration from 10 to 25%. The higher concentrations of consolidant were applied in the final stages of the process on the weakest parts of the wooden support. When the support was sufficiently strengthened, we undertook the infilling of losses and modelling of the missing elements. Infilling advanced in two phases as well. First, we used a two-part epoxy resin¹⁸ to fill in larger areas of damaged wood. We injected the epoxy kit into previously drilled holes, then inserted 8 mm diameter wooden pegs into the holes to strengthen the support construction. We concluded the filling a couple of millimetres below surface level. In the second phase, we used a two-part epoxy paste¹⁹ tinted with powdered pigments to approximate the tone of the wood. We finished the consolidation of the wooden support with treatment of infilled areas. With the stabilised wooden support restored to strength, we were able to continue the removal of overpaint layers at the front of the sculpture.

The high altar of St Henry from the Church of St Henry in Pohorje

We undertook first interventions on the high altar at the beginning of May 2018, following an earlier inspection of the church which had shown the altar in very poor condition. The moisture built up to the point where the stone floor was completely wet, while the gravestone, walls and wooden back of the altar were covered by a thin film of green algae. The polychromy and chalk ground on the altar were lifting, cupping and flaking away from the wooden support. To prevent further loss of the precious polychromy, we applied a consolidating medium to the affected areas over Japan paper with a brush. For the chalk ground consolidant, we chose an acrylic copolymer over the commonly used fish glue.²⁰

In late autumn, we headed to Areh to dismantle the wooden sculptures and smaller parts of the high altar. After building scaffolds and closely inspecting the altar, we decided to disassemble it completely and transfer it to the workshop of the IPCHS Restoration Centre in Ljubljana. The chalk ground with polychromy was in poor condition across the entire surface of the altar. In several areas of the sculptures and architecture the brittle ground layer was cracking and flaking away from the support. Damage of this nature is difficult to remedy *in situ*, all the more so considering the low mean temperature inside the church. Initial interventions on the wooden sculptures and disassembled altar parts were aimed at securing the delaminated polychromy and disinfecting the wooden support at the back.

Dirt and green algae at the back of sculptures and altar elements were cleaned mechanically with brushes, then wiped with wet cloths. When the support was dry, we sprayed and coated it with a colourless formulation²¹ that protects wood from insects and wood-decay fungi. The wooden support of the high altar was in good condition. It had not been targeted by wood-boring insects due to high relative humidity and low temperatures. However, the back of the sculpture of St John of Nepomuk turned out to be damaged by wet rot. The rot had dried up in the past since no rhizomorphs were present on the surface. The wooden support in the lower part of the altarpiece was extensively damaged by brown rot fungi. Although the support of the altar is well preserved in the main part, further inspection found that a number of altar pieces of various sizes are missing. Due to high humidity inside the church, the animal glue used for wood adhesion eventually broke down so that elements of the sculptures, architecture and decoration were detached and lost. For unknown reasons, both hands of St Francis Xavier were sawed off at the wrists, which can be deduced

from tool traces on the wooden support.

Because of the brittle state of the chalk ground layer, which had areas of cleavage and cupping, thick dust sediments were carefully removed with soft brushes. A smaller cleavage in the ground layer was overlaid with Japan paper onto which we applied a 50% acrylic polymer consolidant. The paper prevented the ground falling off while it was dampened with the consolidant and gently pushed back onto the wooden support. The thermoplastic consolidating agent was activated with heating spatulas. Through pressure and heat, the weakened areas of paint layers were reattached to the ground and the wooden support. We removed the paper tissues adhering to the polychromy by using heat.

After the painted chalk ground was smoothed out and consolidated, we carried out a probing of paint layers on several elements of the altar. Probing revealed that the altar was renovated on at least four occasions, mostly to cover the areas where painted chalk ground had fallen off. The original polychromy of the altar architecture was a tempera-painted imitation of marble. In the first renovation attempt, all surfaces on the face of the altar were coated with a thin layer of animal glue chalk ground and painted with tempera in marbling technique. The drapery of the sculptures, which was initially gilded and silvered in water technique with red and green glaze, was overpainted with red and green tempera. This was followed by two more overpaint layers of oil paint, which again imitated marble on the altar architecture. The final overpaint on the high altar, which remains visible today, can be placed stylistically at the beginning of the 20th century. During the probing of several elements of the altar and ornamental carving we did not find any original chalk ground and paint layers. Likewise, the main altar sculpture of St Henry has a single layer of chalk ground with a single layer of paint or gilding. However, in the main niche we found a tempera-painted imitation of marble in red tints covered by four paint layers. We found two, at most four, paint layers on the carnations of the polychromed sculptures.

In view of the probing results, any decision on the final appearance of the altar polychromy will have to be made by an expert committee, which will set the course of further conservation-restoration interventions on the basis of gathered data and experience.

Conclusion

Our department is currently working on three works by the same author, taking a different restoration approach to each of them. The outcome of the conservation-restoration interventions on the wooden sculptures from the Maribor Regional Museum is presentation of the original polychromy with retouched and reconstructed areas of paint loss. Concerning the final appearance of Straub's Štanjel sculp-

tures, the expert commission specified that several layers of paint are to be removed down to the first overpaint layer, beneath which the original paint layer has been preserved in places. The case of the high altar of St Henry is problematic due to numerous past interventions; furthermore, the original polychromy and gilding, or silvering with colour glaze, are only partially preserved.

Analyses of paint layers can produce significant data about the technology of the original and subsequent polychromies of the investigated sculptures. The results allowed us to distinguish between original polychromies and those of a later date. In some cases, we were also able to approximately date the interventions. We therefore contributed new findings to the historical account of the analysed sculptures, which otherwise lacks written sources.

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15 We mixed 100 ml of acetone with 1g of Klucel H and waited for the mixture to swell.

16 Regalrez™ 1126, manufactured by Eastman Chemical Company.

17 Paraloid™ B 72, available from Kremer Pigmente, GmbH & Co.KG.

18 Araldit HV, Araldit SV, available from Samson Kamnik.

19 Woody-wood repairing and restoring paste, manufactured by Samson Kamnik.

20 Lascaux® Medium for Consolidation, manufactured by Lascaux Colour & Restauro.

21 Silvanol®, manufactured by Silvaprodukt Ljubljana, and Borosol, manufactured by Regeneracija Lesce. Both protective formulations are water-based and contain a high concentration of boron salts.

Minka Osojnik, Marta Bensa

Obnova stropa v ladji cerkve Gospodovega oznanjenja Mariji na Kostanjevici v Novi Gorici

Izvirni znanstveni članek

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Povzetek

Frančiškanski samostan Kostanjevica se je v letu 2017 lotil obnove poslikav in štukatur na stropu ladje, zaradi finančne obsežnosti obnove pa je projekt razdelil v etape. V letu 2017 je projekt obsegal obnovo stropa od slavoločne stene do okvira centralne poslikave, vključno s poslikano luneto na slavoločni steni, katere obnova je bila s strokovnega vidika najbolj problematična. V letu 2018 so se dela nadaljevala na preostali površini stropa in se avgusta tudi uspešno zaključila. Dela je izvedla restavratorka iz Vidma Emanuela Querini s sodelavci. Konservatorsko-restavratorski poseg v letu 2017 je sofinanciralo Ministrstvo za kulturo RS v okviru rednega spomeniškovarstvenega projektnega razpisa, poseg v letu 2018 pa Občina Nova Gorica.

Na pobudo odgovorne konservatorke je kmalu po začetku del generalni konservator ZVKDS dr. Peskar sklical strokovno komisijo v sestavi Marta Bensa (ZVKDS, OE Nova Gorica), dr. Helena Seražin (ZRC SAZU), mag. Mira Ličen Krmpotič (Komisija za sakralno dediščino, Škofija Koper), Nina Žbona (ZVKDS, Restavratorski center). Komisija si je dela ogledala po izvedeni fazi čiščenja in podala nadrobne usmeritve ter dela spremljala do konca izvedbe.

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Uvod

Cerkve Gospodovega oznanjenja Mariji na Kostanjevici stoji na griču jugozahodno nad Novo Gorico, tik ob državni meji z Italijo. Enoladijska cerkev je bila zgrajena med letoma 1654 in 1661 na mestu kapele iz leta 1623, do leta 1691 pa je bila razširjena. V cerkvi so od prvotne dekoracije ohranjene štukature iz druge polovice 17. stoletja v prezbitoriju, štukturni okvir na levi steni ladje, štukature na korni ograji in nekaj štukatur v špaletah oken na koru. Kvaliteta kostanjeviških štukatur postavlja to cerkev med osrednje spomenike 17. stoletja na Slovenskem (Jaki Mozetič, 1991: 65–72). Za razliko od prezbitorija, kjer so štukature večinoma še originalne, so bile te v ladji v veliki meri uničene v prvi svetovni vojni in po tem v celoti obnovljene. V letih 1925–1929 so jih obnovili štukaterski mojstri iz Rima. V istem obdobju je bil strop v cerkvi tudi na novo poslikan (Bensa, 2013).

Historiat stropa cerkve

Do prve svetovne vojne je strop v ladji, tako kot preostale dele notranjščine objekta, krasil bogat plašč štukaturne dekoracije iz druge polovice 17. stoletja, polja med štukaturami pa je zapolnjevala stenska poslikava z marijansko ikonografijo, nastala izpod čopiča furlanskega slikarja Leonarda Riga. Rigo je celotno notranjščino poslikal med letoma 1884 in 1886. Sredstva za to zadnjo veliko prenovno cerkve pred prvo svetovno vojno je samostanu podarila Marija Terezija Beatrika Kajetana, nadvojvodinja Avstrijsko-Estenska, grofinja Šambordska, zadnja predstavica družine Burbonov, ki je bila tukaj pokopana (Brecelj, 1989). Leonardo Rigo, ki je bil avtor vseh stenskih poslikav v cerkvi na Kostanjevici do prve svetovne vojne, se je rodil v Vidmu 11. avgusta 1846. Bil je slikar in graver. Kot slikar se je ukvarjal predvsem s sakralno tematiko, večinoma je slikal v *fresco* tehniki. Umetnostna kritika ga opredeljuje kot slikarja bujnega temperamenta, arogantnega in nediscipliniranega. Toda nekatere njegove slike so opredeljene kot »zelo učinkovite« zaradi razkošnosti v kompoziciji, bleščanja luči ter prvotno robustnih in svetlih barv, ki so postopoma postale jasne in hladne, skoraj neoklasicistične (Donazzolo, 2019). Rigova prva dela izvirajo iz zadnje četrtine 19. stoletja; eno od teh je v kupoli prezbitorija videmske katedrale, v katedrali Palmanove pa je Rigo v letih 1880–1882 naslikal freske prezbitorija. Danes so na Kostanjevici od Rigovih poslikav ohranjeni prizori v prezbitoriju, stranskih ladjah ter prizora Marije Tolažnice v luneti slavoločne stene in Marijinega darovanja v templju na severni steni glavne ladje.

Žal je bilo poslopje samostana s cerkvijo med prvo svetovno vojno močno poškodovano. V celoti je bil uničen ladijski strop z dragocenimi štukaturami, ohranila se je le poslikana luneta na slavoločni steni s prizorom Marije Tolažnice, h kateri angeli varuhi vodijo svoje varovance, uboge in nesrečne, vdove in sirote. Tudi poslikana luneta vojne ni preživela brez večjih poškodb, saj je odpadel celoten zgornji del poslikave, spodnji del pa je imel več lukenj od izstrelkov. Po prvi svetovni vojni so cerkev obnovili in do leta 1925 so bila bolj ali manj končana vsa gradbena dela (Brecelj, 1989). V letu 1929 je bil strop ladje ponovno okrašen s štukaturami, narejenimi po načrtih arhitekta Grossija iz Rima. Grossi je sočasno načrtoval tudi nove štukature v goriški stolnici, slikar Giovanni Moro iz Vidma pa je cerkev na novo poslikal (Bensa, 2013). Moro je popravil tudi poslikavo v luneti, doslikal je zgornji del in delno preslikal preostalo.

Giovanni Moro se je rodil 7. februarja 1877 v Ligosullu (Karnija). Strast do slikarstva je pokazal že v mladih letih. V Münchnu je dokončal študij na akademiji za likovno umetnost in postal profesor. Začel je slikati v številnih cerkvah na Bavarskem, nato na Madžarskem, kjer je poslikal med drugim kapelo kraljeve palače. Proti koncu stoletja se je vrnil v Furlanijo, kjer je leta 1920 v Vidmu odprl atelje. Bil

je vsestranski slikar, ustvarjal je stenske poslikave v notranjostih cerkva, oljnate slike na platnu, reklamne panoje ... Kot član Sakralne komisije je imel možnost ustvarjati v številnih cerkvah na območju današnje Furlanije – Julijske krajine pa tudi izven nje: poslikal je salezijansko cerkev na Reki, cerkev na Kostanjevici pri Novi Gorici, cerkev v Ravnici in v Solkanu ... Uvrščamo ga med najboljše furlanske slikarje sakralne umetnosti zgodnjega dvajsetega stoletja. Umril je leta 1949 (Marra, 2012).

Leta 1974 je takratni Zavod za spomeniško varstvo Gorica dal soglasje za čiščenje fresk in štukatur na stropu cerkvene ladje, restavriranje grobo poškodovanih štukatur v prezbitoriju in fresk na levi strani glavne cerkvene ladje ... Obnovitvena dela naj bi vodil prof. Izidor Mole (Smole, 1977).

Naslednja katastrofa, ki je zadela samostan s cerkvijo in še posebej obravnavano luneto, je bil potres leta 1976. Po celotnem objektu so se pojavile številne razpoke, več kosov štukature je odpadlo, slavoločna stena v ladji se je premaknila za 10 cm, z lunete pa sta odpadla 2 m² poslikave oz. skoraj celotna desna figuralna skupina. Zelo hitro po potrebi je stekla akcija obnavljanja poškodovane notranjščine cerkve in samostana. Izvedena je bila statična konsolidacija, restavrirani so bili štuk in slikarije (Smole, 1979). Odpadli deli poslikave v luneti na slavoločni steni je bil takrat na novo naslikan, tokrat precej neposrečeno.

Obnova lunete na slavoločni steni

Stanje, s katerim smo se soočili ob začetku restavratorske obnove, je bilo naslednje: splošno statično stanje je bilo izredno slabo, omet je odstopal, veliko je bilo votlih predelov, kar je bila verjetno posledica dejstva, da je sedanja luneta pozidana na območju nekdanjega termskega okna; poslikava je bila po celotni površini potemnela zaradi prahu in površinske umazanije; na večjih površinah sta bila zaradi izgube veziva prisotna pulverizacija in odpadanje barvne plasti; nekateri deli ometa so bili slabo pritrjeni na zid, in sicer z neprimernimi kovinskimi vijaki. Spodnji del poslikave, ki ga je naslikal Leonardo Rigo, je bil izveden v tehniki *fresco buono* (prava freska), ki je zelo obstojna, vendar je bila poslikava zaradi dolgoletne izpostavljenosti dežju in soncu po prvi svetovni vojni, ko objekt ni imel strehe, zbledela, barvna plast je bila sprana. Zgornji del poslikave, ki ga je po prvi svetovni vojni naslikal Giovanni Moro, je bil izveden v tehniki *mezzo fresco* (apnena tehnika), na določenih predelih verjetno tudi v tehniki prave freske. Njegova barvna plast je bila prav tako zelo obstojna in se pri postopkih čiščenja ni brisala. Kasneje je bila poslikava vsaj še trikrat restavrirana oz. preslikana, desni del, ki je med potresom odpadel, pa je imel povsem novo poslikavo, za

katero smo se že pred začetkom del odločili, da se v celoti odstrani in rekonstruira po ohranjenih fotodokumentaciji (slika 1).

Velik problem pri obnovi poslikave so predstavljale preslikave, izvedene po letu 1929, ki so bile tako obsežne, da niso omogočale jasnega razlikovanja med rokama obeh avtorjev. Šele po prvih poskusih čiščenja in izvedenih naravoslovnih preiskavah smo lahko razložili oba dela originalne poslikave, njuno kvaliteto in stopnjo ohranjenosti. Najprej se je razlika med obema avtorjema pokazala v izvedbi ometa, saj je Rigo slikal v pravi freski na zaglajen omet, Moro pa z apneno mešano tehniko na bolj grobo izveden omet. Težavo je predstavljal predvsem stik obeh poslikav, saj je Giovanni Moro svoj del poslikave povezoval z originalnim tako, da je z apneno tehniko preslikal dele glajenega originalnega poslikanega ometa, kar ni dopuščalo trdnega oprijema.

Izvedli smo preiskave dveh vzorcev, odvzetih z zgornjega dela poslikave lunete, ki ga je v celoti izvedel Giovanni Moro (Bešlagić, Kavkler, 2017). Iz analiz vzorca, vzetega na predelu modrega neba – GOM 2 (slika 2), je bilo razvidno, da je bil na omet (sloj 1) nanesen tanek sloj beleža (sloj 2), FTIR spektroskopija je potrdila, da ta sloj vsebuje kalcijev karbonat. Sledil je 3-slojni originalni barvni nanos: najprej svetlo modra (sloj 3), potem temnejša modra (sloj 4), v katerih so bili kalcijev karbonat, kalcijev sulfat in ultramarin modra, nato še sloj rjave (sloj 5), kar bi lahko predstavljalo lazuro. V teh slojih smo zaznali tudi protein in lipid oziroma jajčno tempero, kar je potrdilo, da je Moro slikal z mešano tehniko. Na sloj rjave je bil nanesen svetlo sivi barvni sloj (sloj 6), sestavljen iz kalcijevega karbonata, kalcijevega sulfata dihidrata, kalcijevega oksalata, malo silikatov in proteina, ki lahko predstavlja kasnejšo preslikavo.

Iz analiz vzorca, odvzetega z zelene krošnje drevesa – GOM 3 (slika 3), je bilo razvidno, da je na beležu (sloj 1) sloj svetlo modre (sloj 2), na kateri smo zaznali ultramarin modro, kalcijev karbonat in malo kalcijevega sulfata dihidrata. Na svetlo modro je bila nanesena rumenozelena barvna plast, po vsej verjetnosti preslikava (sloj 3). Z ramansko in FTIR spektroskopijo smo v tem rumenozelenem barvnem sloju identificirali naslednje pigmente, primesi in nečistoče: železove okside, ogljikovo črno, albit, viridian, titanov dioksid, kalcijev karbonat, kalcijev sulfat dihidrat, dolomit, kalcijev oksalat, protein (jajčna tempera?).

Po opravljenih analizah in čiščenju je strokovna komisija sklenila, da se pri končni prezentaciji slike na delih, kjer se roki obeh avtorjev prekrivata, da prednost prvi fazi poslikave iz naslednjih razlogov: Leonardo Rigo je poslikavo izvedel v fresko tehniko in je bila zato njegova plast najboljše ohranjena; kasnejše preslikave (vključno s tisto, ki jo je izvedel Moro) so bile nejasne, težko jih je bilo ločiti med sabo, nekatere med njimi so bile izredno moteče; druga faza poslikave, ki jo je izvedel Moro, je bila na več mestih neberljiva, zaradi njegove tehnike slikanja na suh omet jo je bilo predvsem na stiku s starejšo poslikavo nemogoče očistiti kasnejših preslikav; za rekonstrukcijo celotnega de-

snega dela poslikave je bila najbolj primerna in kvalitetna fotografija iz časa tik po vojni, ko je bila poslikava v celoti delo Leonarda Riga. Komisija je sklenila, da se v zgornjem delu, kjer je bila poslikava Riga med vojno uničena, prezentira plast, ki jo je izvedel Giovanni Moro. Ta se mora čim boljše očistiti umazanije in neustreznih preslikav, nato pa se mora v delih Marijine draperije (rokav) barvno uskladiti s spodnjim delom, ki ga je izvedel Rigo. V tem stiku med spodnjim in zgornjim delom Marije se je kasneje med deli pokazala dodatna težava, saj je Giovanni Moro ta del prizora precej spremenil. Poleg ikonografske spremembe – prvotno nežno in ljubečo Marijo Tolažnico je spremenil v strogo frontalno na prestolu sedečo Marijo Kraljico – je Moro Marijo tudi precej povišal in skoraj v celoti preslikal njeno obleko.

S spodnjega dela poslikave so se z oblogami 10-odstotne raztopine amonijevega karbonata odstranile vse preslikave, medtem ko je bilo čiščenje na zgornjem delu izvedeno postopoma, saj so bile preslikave zelo podobne originalni tehniki. Preslikave s proteinsko tempero so se odstranile s karpopolnim gelom z dodatkom citronske kisline in trietanolamina. Po osušitvi se je gel odstranil s silikonskimi lopaticami. Za odstranjevanje akrilnih preslikav so bili uporabljeni tamponi z alkoholom in acetonom. Omet je bil strukturno povezan z opeko z injekcijsko peno in injektirno maso. Odstranili so se stari vidni vijaki, vse razpoke in vrzeli ometa so bili pokitani z apneno malto in marmornim prahom v teksturi, podobni originalu. Kromatična integracija je bila izvedena s tehniko vibriranih pikic, da bi lahko manjkajoče dele rekonstruirali čim bolj zvesto, vendar na prepoznaven način (Querini, 2017).

Rekonstrukcija desne figuralne skupine se je izvedla po ohranjeni fotografiji, ki se je povečala v razmerju 1 : 1. Nato so se pripravili kartoni za prenos slike na omet, za slikanje so se uporabile bolj stabilne silikatne barve.

Po končanem restavratorskem posegu je ostala vidna večja horizontalna razpoka v osrednjem delu, saj bi obsežnejše kitanje njenih robov prekrilo večji del originalne poslikave. Razpoka, ki je obenem nema priča kratke, a izredno burne zgodovine sakralne stenske poslikave, bo manj moteča ob vzpostavitvi primernejše notranje razsvetljave (slika 4).

Obnova štukatur na stropu ladje

Po opravljenih pregledih pisne in fotografske dokumentacije in sondiranjih se je ugotovil prvoten videz stropa ladje, ki je bil na novo izveden leta 1929. Štukature so bile izvedene z apnom in mavcem, pobarvane s svetlo rumeno barvo in delno pozlačene, polja med štukaturami niso imela danes vidne marmoracije, temveč so jih krasile svetlejšje dekoracije v obliki preprostih kartuš. Ker pa je nova dekoracija stropa ladje »zaradi svoje enotne barve bila dolgočasna, kar je uničilo učinek fresk in štukatur«, so se

frančiškani leta 1938 odločili za novo dekoracijo; izvedel jo je slikar Giovanni Pertot iz Gorice (Arhiv Frančiškanskega samostana Kostanjevica, 1924–1947). Preko originalne plasti so bile štukature prebarvane v svetlo bež barvo, polja med njimi pa so dobila dekoracijo v obliki marmoracije in cvetličnih vitičastih vzorcev. Ta plast je bila ohranjena ob pričetku konservatorsko-restavratorskega posega.

Strokovna komisija se je odločila, da se na štukaturah in poljih med njimi prezentira zadnja ohranjena plast, ki se konservira, očisti, utrdi in retušira le na poškodovanih oz. v preteklosti neustrezno restavriranih mestih, in sicer iz naslednjih razlogov: obe plasti poslikav sta bili izredno prhki, vezivnost je bila slaba, spodnjo plast je bilo praktično nemogoče odkriti, ne da bi jo zelo poškodovali (verjetno tudi zaradi kratkega časovnega odmika med nastankom obeh slojev); notranjščina cerkve s sedanjo dekoracijo stropa deluje ubrano, lepo se poveže tudi s prezbiterijem in preostalimi štukaturami nižje v ladji; v župnijski kroniki je napisano, da je manj kot 10 let po nastanku novega stropa ladje Giovanni Pertot s štukaturami in poslikavo na novo okrasil strop ladje, ker se je ta zdel ljudem preveč dolgočasen, tako da ima ta dekoracija poleg estetske tudi določeno zgodovinsko-pričevalno vrednost.

Iz rezultatov opravljenih preiskav vzorca, vzetega s štukature obrobe lunete slavoločne stene, je bilo razvidno, da je na belo štuk maso (sloj 1) nanesena oker barvna plast (sloj 2). Sledi nanos svetlejšje oker barvne plasti (sloj 3). Meja med barvnima nanosoma ni jasno razvidna na stratigrafiji vzorca v vidni svetlobi, je pa bolj razvidna na stratigrafiji vzorca, ki je bil narejen v ultravijolični fluorescenci. V obeh barvnih plasteh smo z ramansko in FTIR spektroskopijo identificirali enake materiale, in sicer kalcijev sulfat dihidrat, kalcijev karbonat, kalcijev oksalat, rdečo okro in rumeno okro. V spodnji oker barvni plasti pa smo identificirali tudi črn pigment na osnovi ogljika. Omeniti velja tudi, da spodnja oker barvna plast, glede na FTIR rezultate, vsebuje več kalcijevega sulfata dihidrata kot kalcijevega karbonata, medtem ko je v zgornji svetlo oker barvni plasti več kalcijevega karbonata kot kalcijevega sulfata dihidrata. Na podlagi FTIR spektrov sklepamo, da je v zgornji svetlo oker barvni plasti (sloj 3) prisotna tudi proteinska komponenta (Bešlagić, Kavkler, 2017). Med barvnima slojema ni vidne plasti umazanije – patine –, kar potrjuje, da je bil zgornji svetlo oker barvni sloj nanesen kmalu po nanosu prvotne oker barvne plasti oziroma niti 9 let kasneje.

Vse površine štukatur in marmoracije so bile prekrte z debelim slojem prahu in umazanije (slika 5), poleg tega je bila barvna plast zelo pulverizirana. Prvotna pozlata, ki je bila izdelana iz zlatih listov, je bila v neki fazi neustrezno restavrirana, tako da je bila ponekod preko pozlate oziroma namesto poškodovane pozlate nanesena bronza, ki je z leti oksidirala. Neustrezni obnovitveni posegi so bili v preteklosti izvedeni tudi na določenih delih z marmoracijo, predvsem na mestih, kjer je puščala streha. Na nekaterih delih so bile značilne spremembe zaradi meteorne vode,

na nekaterih točkah je bila štukturna masa razpokana (slika 6).

Ugotovili smo, da je bilo ogrodje štukatur narejeno iz trstike in apnene malte. Kjer so bile na štukaturah dovolj velike luknjice, smo z majhno endoskopsko kamero lahko pregledali votlino med štukaturami in zidanim delom oboka. Videli smo rjaveče žblje, pripete na obok, na njih je zavezana verjetno pocinkana žica, ki je pripeta v trstike hrbitišča štukatur. Na teh delih, kjer je med štukaturami in zidanim stropom prazen prostor, je omogočeno tudi prezračevanje, ki pozitivno vpliva na obstojnost materialov.

Površine štukatur so bile očiščene s čopiči in sesalnikom, preslikave so bile odstranjene z raztopino alkohola in acetona v razmerju 30 : 70 s tamponi, ponekod je bilo treba uporabiti benzil alkohol v gelu. Pozlata je bila očiščena s puferskimi raztopinami pH 8,5 (slika 7). Nestabilni elementi so bili pritrjeni z vinilnim lepilom, po potrebi so se v lepilo dodala še steklena vlakna in gaza. Celotna površina je bila utrjena s 5-odstotnim Aquazolom 500 v raztopini alkohola in vode v razmerju 4 : 1 z airbrushem dvakrat po 24 ur. Vrzeli so se fugirale z apnom in mavčno malto ter se mimetično retuširale. Večji deli manjkajoče pozlate so se na novo pozlatili z lističi 23 in 3/4 karatov na mikstjon, nato so se patinirali z nanosom judovskega bitumna. Manjše razpoke in poškodbe so se dopolnile z zlatom v prahu.

Obnova poslikav na stropu ladje

Freske na oboku sodijo med kvalitetnejša dela slikarja Giovannija Mora iz Vidma. Osrednje mesto na stropu zavzema poslikava Marijinega kronanja v velikosti 7,4 x 5 m (slika 10), v manjših medaljonih in štukaturnih okvirjih so uprizorjeni personifikacije in simboli, ki dopolnjujejo program z marijansko ikonografijo (Brecelj, 1989).

Tehnika slikanja je zelo podobna tisti, ki jo je slikar uporabil ob restavriranju oziroma rekonstrukciji poslikave v luneti slavoločne stene (Bešlagić, Kavkler, 2018). Na grobem ometu je slikar izvedel velike dnevnicke v fresko tehniko, senčenje in podrobnosti je dokončal v apneni mešani tehniki, za katero je uporabil najverjetneje apneno mleko in jajčno tempero. Predeli, ki so bili izvedeni v apneni tehniki, so ponekod deloma izgubili zadnji sloj barvne plasti. Prepoznali smo vsaj dva pretekla restavratorke posega in različne metode preslikav/retuš, eno s kredastimi barvami, drugo z akrilnimi in kazeinskimi. Celotna površina je bila prekrita s plastjo umazanije in saj, barvna plast se je deloma luščila, prisotne so bile mikrorazpoke, v preteklih posegih pokitani deli so na več mestih prekrivali originalno barvno plast. V južnem predelu so bili prisotni podobni kovinski vijaki kot v luneti, s katerimi je bil omet pritrjen na steno po potresu iz leta 1976 (slika 9). Večje razpoke so bile stabilne.

Čiščenje umazanije kredaste preslikave se je izvedlo na

skoraj 80 odstotkih površine z wishab gobicami in nato še s spužvami, namočenimi v demineralizirano vodo. Za ostale akrilno-kazeinske preslikave se je uporabil aceton s tamponi (slika 8). Utrjevanje barvne plasti se je izvedlo s 5-odstotnim Aquazolom 200 v demineralizirani vodi, apliciran s čopičem preko enojnega sloja japonskega papirja. Postopek je bil ponovljen dvakrat po 24 ur. Votli deli ometa so se na nosilec pritrdili tako, da so se zvrtele majhne luknjice in se je vbrizgala injektirna masa PLM, manjše razpoke so se pritrdile z Primalom 33. Neprimerno pokitani deli so se odstranili in izvedli na novo v podobni teksturi originalnega ometa z apnom in peskom različne granulacije v razmerju 1 : 3. Za retušo se je uporabil 1-odstoten Tyloso s tehniko črtkanja in tonskega izenačenja (Querini, 2018).

Nova dognanja o poslikavi lunete

Med deli je ZVKDS s pomočjo samostana nadaljeval arhivske raziskave; te so bile uspešne, saj smo pravočasno pridobili potreben fotografski material iz Rima (Museo del Risorgimento), s katerim se je lahko izvedla verodostojna rekonstrukcija manjkajočih delov poslikave lunete na slavočni steni.

Ob podrobnem pregledu poslikave se je pokazala zanimiva »napaka«, ki jo je zakrivil že Giovanni Moro, ko je po prvi svetovni vojni sliko obnovil in dopolnil. Ugotovili smo, da je v figuralni skupini levo od Marijinega prestola manjkala glava enega od angelov varuhov. Zakaj je Moro ni na novo poslikal, ni znano, in očitno tega do sedaj nihče niti ni opazil. S pomočjo arhivske fotografske dokumentacije smo ob restavriranju manjkajočo glavo rekonstruirali (slika 11).

V fazi čiščenja poslikave in odstranjevanja kasnejših manj kvalitetnih preslikav se je pod nogami Matere Božje pokazala veduta okoliških hribov, in sicer Sabotina in Svete gore na levi strani debla ter Škabrijela na desni (slika 13). Na veduti je jasno vidna tudi cerkev na Sveti gori, ki pa je tako majhna, da je s prostim očesom od spodaj komaj zaznamo. Upodobitev priča o tesni povezanosti obeh samostanov, saj so bili frančiškani s Svete gore pregnani v času jožefinskih reform, po 25-letnem »izgnanstvu« v Gorici pa so se leta 1811 preselili na Kostanjevico (Šrumpf, 2013).

Med samim restavriranjem poslikave smo se vsi vpleteni večkrat spraševali tudi o pomenu temno modre vaze z zlatimi obroami, ki stoji na eni od stopnic pod Marijinim prestolom, levo od sedečega angela z lutnjo. Ker sta iz vaze gledali dve beli liliji, smo sklepali, da sta naslikani kot Marijin simbol (slika 12). Po prvi fazi čiščenja preslikav se je izkazalo, da so bile prvotno tri lilije, vaza pa ni bila temno modra, temveč črna.

Pater Stanislav Škrabec je v letih 1906 in 1907 v Cvetju z vrtov sv. Frančiška pod naslovom Naša Kostanjevica objavil prevod in predelavo zgodovine cerkve in samostana na Kostanjevici, ki jo je leta 1848 napisal in izdal, delno pa

zapustil v kasnejših rokopisih pater Klarus Vaskotti (Chi-aro Vascotti). V teh zapisih je zanimiv in precej nadroben opis dveh »jako lepih vaz iz sevrškega porcelana«, ki jih je na Kostanjevico leta 1854 iz Pariza poslal francoski markiz Charles de Villette. Nadvse dragoceni vazi, večinoma modre barve in bogato pozlačeni, z bronastimi pozlačeni ročaji v obliki »otroških siren« in posvetilnimi napisi, sta bili kot grobni urni postavljeni nad takratno grobnico Burbonov, ob oltar Karmelske Matere Božje. Očitno sta po prestavitvi krst francoskih plemičev pod prezbiterij vazi ostali ob oltarju Karmelske Matere Božje in že pater Klarus je ugotavljal, da to mesto za vazi nekako ni več primerno. Piše, da si bo »čislani bralec morda mislil, da bi jima bilo pravo mesto na vsak način na velikem oltarju, ob straneh najimenitnejšega, kar je v cerkvi, tabernaklja, kjer je prvič zato kakor nalašč zadosti praznega prostora, drugič so tam zdolaj pokopani ti, ki sta jim vazi namenjeni, in naposled je sedanji tabernakelj postavljen na stroške poslednje izmed spod shranjenih kraljevih mrtvih« (Škrabec, 2002: str. 72–74).

Za »selitev« francoskih plemičev v grobnico pod prezbiterij je namreč poskrbela zadnja izmed tam pokopanih, seveda pred svojo smrtjo, Marija Terezija Beatrika Kajetana nadvojvodinja Avstrijska Estenska, grofinja Šambordska. V Cvetju z vrtov svetega Frančiška izvemo, da je poleg ureditve grobnega prostora grofinja Šambordska darovala več kot 15.000 goldinarjev za obnovo samostana in cerkve. S tem denarjem se je nad prezbiterijem sezidala svetlobnica, naredila sta se stranska vhoda v prezbiterij, očistil se je glavni oltar in naredil nov tabernakelj. Tako v prezbiteriju kot v ladji so se očistile, popravile in na novo pozlatile štukature, postavila se je nova kamnita prižnica, celotna cerkev se je »sijajno zmalala«, s čimer je avtor teksta mislil na celotno poslikavo s prizori z marijansko vsebino. Posebno zanimiv je opis poslikave v luneti na slavočni steni: »Na polkrožni steni, ki je nad vhodom v prezbiterij, se vidi na oblaku mati božja z detetom Jezusom v naročju, za njo kostanjevo drevo ko posebno znamenje te cerkvice, od obeh strani spremljajo k Mariji angeli varuhi svoje varovance, vboge in nesrečne, vdove in sirote ... Slikar, ki je to delo za primerma neprevisoko ceno prevzel in večinoma doveršil, je Leonardo Rigo iz Vidma. Prednost njegova so lepe, žive barve, ki delajo slike jako prijazne, in perspektiva, ki nam kaže mnogo na primeroma majhnem prostoru. Brez napak sicer, kaker nobeno človeško delo, tudi te slike ne bodo, vendar se more sploh reči, da si je visoka gospa ž njimi lep spominik postavila na grob ter bi jo bilo gotovo jako veselilo, če bi jih bila še videla.« (Škrabec, 1885–1886: str. 213–215)

Ob prebiranju zgodovine samostana se je zaradi novih odkritij med restavratorskimi posegi porodila povsem nova ideja o pomenu črne vaze pod Marijinim prestolom, ki se je pozornemu bralec zgornjih vrstic verjetno že izbistrila. Ker je poslikavo naročila zadnja od Burbonov, ki je tudi poskrbela, da se je pod prezbiterijem uredila kraljevskemu

stažu primerna grobnica, je nad to grobnico postavila vazo, ali bolje rečeno – nagrobno urno, iz nje pa gledajo tri lilije, ne kot simbol Marijine brezmadežnosti, temveč kot simbol francoske kraljeve družine (Osojnik, 2018).

V vazah, ki ju je leta 1854 iz Pariza poslal markiz de Villette, sta bila šopka iz lilij, kot simbol francoske kraljeve družine, in belih cvetic, imenovanih »hesperih matronalis«, po slovensko bela nočnica, pater Škrabec jih je imenoval »večernice«. Te naj bi bile v vazah kot spomin na smrt, »ki je bila darovalcu tolikanj živeje pred očmi, ker je bil on sam tako rekoč poosebljen »večer« svojega rodu in imena«. Morda je tudi črna vazo z lilijami Leonardo Rigo na poslikavo z Marijo Tolažnico naslikal po naročilu zadnje Burbonke, ki si je postavila spomenik na svoj grob in na grob svojih prednikov, zavedajoč se, da tudi z njo rod izumira.

Zaključek

Obnova stropa v ladji cerkve Gospodovega oznanjena Mariji na Kostanjevici je bil obsežen in zahteven projekt, ki je v dveh letih uspešno zaključil prvi segment restavratorskih obnovitvenih del v notranjščini cerkve. Hkrati je ta projekt uvod v obnovo celotne notranjščine cerkve, ki se v letu 2019 nadaljuje s konservatorsko-restavratorskim projektom obnove štukatur na korni ograji in v špaletah oken na koru, ki jih datiramo v drugo polovico 17. stoletja. Zaradi velikega zanimanja, ki ga je pokazala lokalna skupnost ob obnovi prvega dela stropa, je Zavod za varstvo kulturne dediščine, OE Nova Gorica, kot novost med izvajanjem restavratorskih del na stropu uvedel sprotno obveščanje javnosti v obliki informativnega lista z naslovom Kaj se dogaja zgoraj, ki je izšel v osmih številkah. Prav tako so bile med deli in po njih opravljena številna vodstva za otroke, mladino in odrasle ter delavnica o štukaturah v okviru tedna vseživljenjskega učenja.

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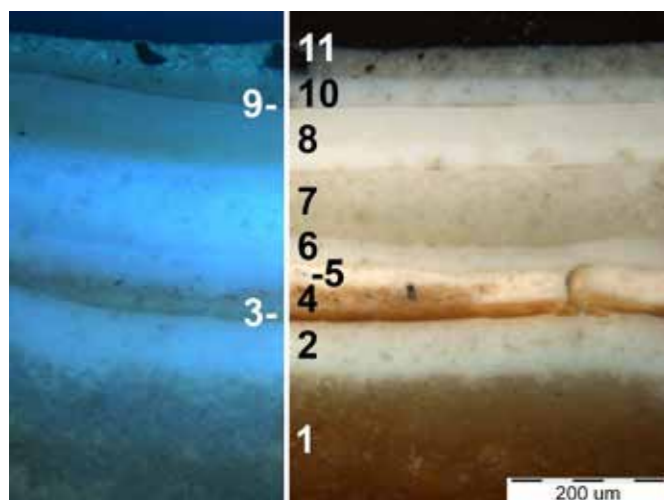
1. Luneta na slavoločni steni pred obnovo s prikazom faz poslikave: 1 – Leonardo Rigo (1884–1886), 2 – Giovanni Moro (1929), 3 – neznan »slikar« po potresu 1976 (foto: Emanuela Querini)

1. The lunette on the chancel wall before restoration showing the phases of painting: 1 – Leonardo Rigo (1884–1886), 2 – Giovanni Moro (1929), 3 – unknown "painter" after the 1976 earthquake (photo: Emanuela Querini)



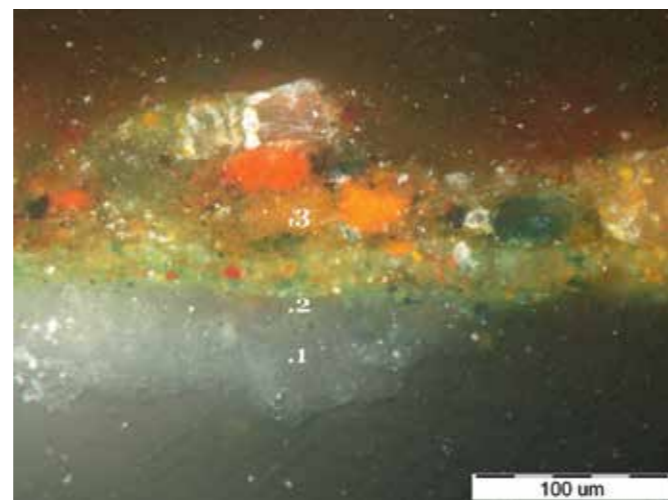
4. Prizor Marije Tolažnice v luneti na slavoločni steni po restavratorskem posegu (foto: Minka Osojnik)

4. Painting of Our Lady of Succour in the lunette on the chancel wall following restoration (photo: Minka Osojnik)



2. Vzorec GOM2 (foto: Petra Bešlagić, Katja Kavkler)

2. Sample GOM2 (photo: Petra Bešlagić, Katja Kavkler)



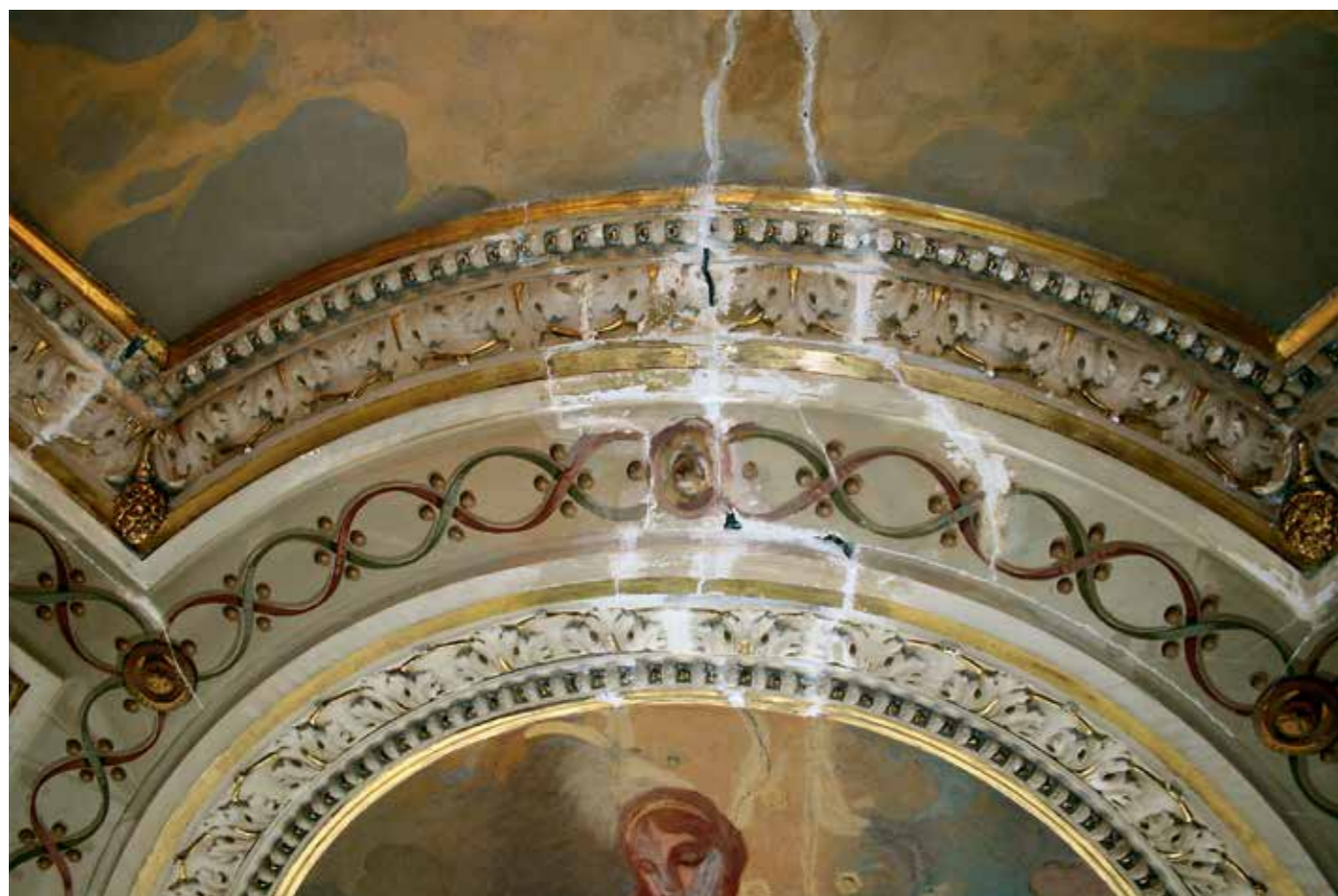
3. Vzorec GOM 3 (foto: Petra Bešlagić, Katja Kavkler)

3. Sample GOM 3 (photograph: Petra Bešlagić, Katja Kavkler)



5. Debeli sloji prahu in umazanije na štukaturah stropa (foto: Emanuela Querini)

5. Thick layers of dust and dirt on the stuccowork of the ceiling (photo: Emanuela Querini)



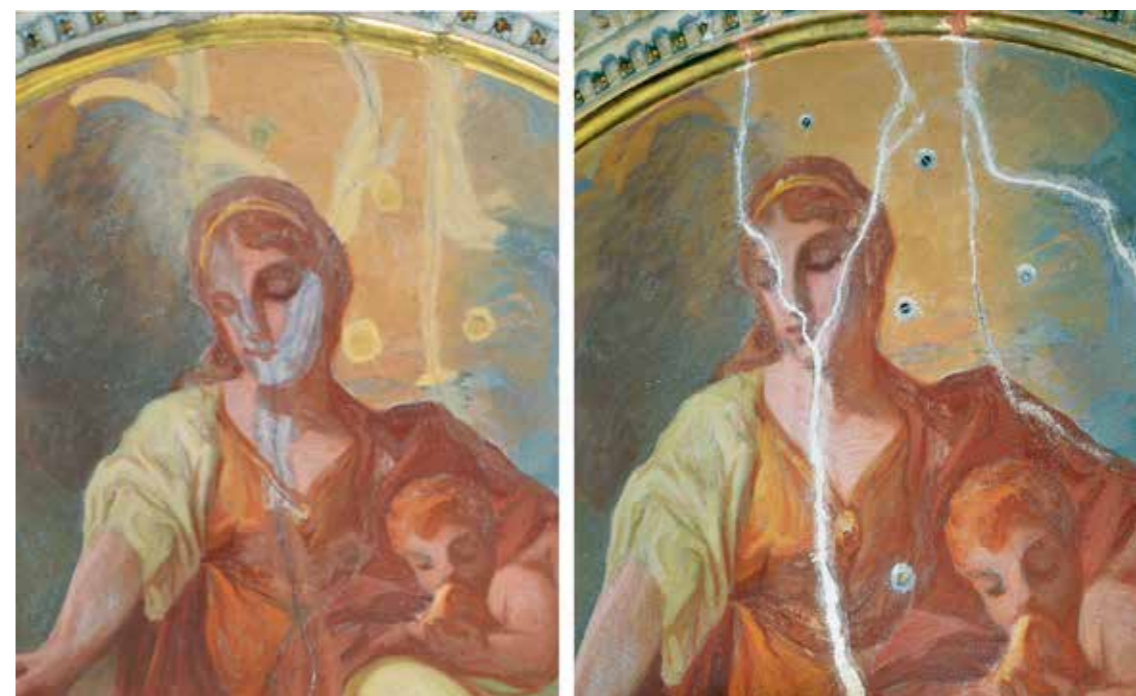
6. Kitanje poškodb na štukaturah in poslikavah na stropu ladje (foto: Marta Bensa)
 6. Application of filler to damage on the stuccowork and paintings on the nave ceiling (photo: Marta Bensa)



7. Poskus čiščenja originalne pozlate na štukaturah stropa (foto: Emanuela Querini)
 7. Attempt at cleaning the original gilding on the stuccowork of the ceiling (photo: Emanuela Querini)



8. Odstranjevanje preslikav na osrednjem prizoru Marijinega kronanja (foto: Marta Bensa)
 8. Removal of overpaintings in the central scene of the Coronation of Mary (photo: Marta Bensa)



9. Odstranjevanje neustreznih pokitanih delov in neustrezne retuše (foto: Minka Osojnik)
 9. Removal of unsuitable fills and retouchings (photo: Minka Osojnik)



10. Prizor Kronanja Marije po restavratorskem posegu (foto: Minka Osojnik)
 10. The scene of the Coronation of Mary after the restoration (photo: Minka Osojnik)



11. Leva figuralna skupina z »brezglavim« angelom; levo pred posegom (foto: Minka Osojnik), desno po posegu (foto: Emanuela Querini)
 11. The left-hand figural group with the "headless" angel; left: before restoration (photo: Minka Osojnik); right: after restoration (photo: Emanuela Querini)



12. Detajl poslikave v luneti z angelom, temno modro vazo z dvema lilijama in hribovito pokrajino v ozadju (foto: Minka Osojnik)

12. Detail of the painting in the lunette showing an angel, a dark blue vase with two lilies and the hilly landscape in the background (photo: Minka Osojnik)



13. V fazi odstranjevanja kasnejših manj kvalitetnih preslikav se je izkazalo, da so bile prvotno tri lilije, vaza pa ni bila temno modra, temveč črna. V ozadju se je odkrila veduta okoliških hribov Sabotina in Svete gore na levi strani debla ter Škabrijela na desni (foto: Minka Osojnik).

13. During the removal of later, poorer quality overpaintings it became apparent that there were originally three lilies and that the vase was not dark blue, but black. The background revealed a view of the surrounding hills Sabotin and Sveta Gora (to the left of the tree trunk) and Škabrijel (to the right) (photo: Minka Osojnik).



14. Pogled na strop po restavratorskem posegu (foto: Marta Bensa)

14. View of the ceiling after restoration (photo: Marta Bensa)

Minka Osojnik, Marta Bensa

Restoration of the nave ceiling in the Church of the Annunciation at Kostanjevica, Nova Gorica

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Abstract

In 2017 the Franciscan friary of Kostanjevica, near Nova Gorica, began restoring the paintings and stuccowork on the ceiling of the nave of the friary church. Given the high costs of the restoration, the project was divided into stages. In 2017 the project consisted of restoration of the ceiling from the chancel wall to the frame of the central painting, including the painted lunette on the chancel wall, the restoration of which was most problematic from the technical point of view. Work continued in 2018 on the remaining area of the ceiling and was successfully concluded in August of that year. The work was carried out by Emanuela Querini, a restorer from Udine, and colleagues. The conservation-restoration intervention in 2017 was co-funded by the Slovenian Ministry of Culture in the context of its regular call for funding applications for projects in the monument protection and conservation field, while the work in 2018 was co-funded by the municipality of Nova Gorica. Shortly after work began, ZVKDS head conservator Robert Peskar convened, at the suggestion of the responsible conservator, an expert commission consisting of Marta Bensa (ZVKDS, Nova Gorica regional unit), Helena Seražin (ZRC SAZU), Mira Ličen Krmpotič (Sacred Heritage Committee, Diocese of Koper), Nina Žbona (ZVKDS, Restoration Centre). The commission carried out an inspection following completion of the cleaning phase and offered detailed directions and monitored the work until completion.

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Marta Bensa, Institute for the Protection of Cultural Heritage of Slovenia

History of the church ceiling

Up until the First World War the nave ceiling, like the other parts of the church interior, was adorned with a rich layer of stucco decoration dating from the second half of the seventeenth century. The fields between the stucco mouldings were filled with wall paintings containing examples of Marian iconography, the work of the Friulian painter Leonardo Rigo, who painted the entire interior between 1884 and 1886. The funds for this last great restoration of the church before the First World War were donated to the friary by Archduchess Maria Theresa of Austria-Este, Countess of Chambord, the last member of the House of Bourbon, who was also buried in Kostanjevica (Brecelj, 1989). Leonardo Rigo, the painter of all the frescoes in the church at Kostanjevica before the First World War, was born in Udine on 11 August 1846. He was a painter and an engraver. As a painter, he mainly worked with religious themes and for the most part painted in the *fresco* technique. Art critics characterise him as “a painter of exuberant temperament and an arrogant and undisciplined brush”, some of whose paintings were, however, “highly effective” thanks to the sumptuous grandeur of their composition, the brilliant use of light and initially strong and vibrant colours that gradually became clear and cool, in an almost neoclassical style (Donazzolo, 2019). Rigo’s earliest works date from the last quarter of the nineteenth century and include a painting on the vault of the cupola over the sanctuary in Udine Cathedral. Between 1880 and 1882 he painted the frescoes in the sanctuary of the Duomo of Palmanova. The surviving paintings by Rigo in the church at Kostanjevica consist of scenes in the sanctuary and side chapels, the painting of Our Lady of Succour on the lunette of the chancel arch and the painting of the Presentation of the Blessed Virgin Mary on the north wall of the nave.

Unfortunately, the friary and church were badly damaged during the First World War. All that survived was the painted lunette on the wall of the chancel arch, showing a scene in which guardian angels are bringing their wards – the poor and unfortunate, widows and orphans – to the “Madonna del Soccorso”, Our Lady of Succour. Not even the painted lunette survived the war without major damage, since the entire upper part of the painting fell away, while the lower part was riddled with bullet holes. The church was rebuilt after the war, with all construction work more or less complete by 1925 (Brecelj, 1989). In 1929 the nave ceiling was redecorated with stucco mouldings designed by the architect Francesco Grossi of Rome. Grossi simultaneously designed new mouldings for the cathedral in Gorizia, while the painter Giovanni Moro of Udine repainted the church (Bensa, 2013). Moro also repaired the painting in the lunette, painting in the missing upper part and partially repainting the remainder.

Giovanni Moro was born in Ligosullo (in the Carnia region

of north-eastern Friuli) on 7 February 1877 and showed a passion for art from an early age. After graduating from the Academy of Fine Arts in Munich, where he attained the title of professor, he began painting in numerous churches in Bavaria, and then in Hungary, where he also decorated the chapel of the royal palace. Towards the end of the century, he returned to Friuli, opening his own studio in Udine in 1920. He was a versatile painter, with works ranging from wall paintings in churches to oil paintings on canvas and even advertisement posters. As a member of the regional Sacred Art Commission, he had the opportunity to work in numerous churches both within the present-day Friuli-Venezia Giulia region and beyond it: he painted the Salesian church in Fiume (present-day Rijeka, in Croatia), the church at Kostanjevica near Nova Gorica and the churches in Ravnica and Solkan. He is considered one of the finest Friulian painters of sacred art of the early twentieth century. He died in 1949 (Marra, 2012).

In 1974 the Gorica Monument Protection Institute (as it was then known) in Nova Gorica issued consent for the cleaning of the frescoes and stuccowork on the ceiling of the nave and restoration of the badly damaged stuccowork in the sanctuary and the frescoes on the left side of the nave. The restoration work would be led by the painter Izidor Mole (Smole, 1977).

The next catastrophe to befall the friary and church, and in particular the lunette on the chancel wall, was the 1976 earthquake. Numerous cracks appeared throughout the structure, several pieces of stuccowork fell off, the chancel arch shifted by 10 cm and 2 m² of painting (almost the whole of the group of figures on the right) fell from the lunette. Work to repair the damaged interior of the church and friary took place very quickly after the earthquake. Static consolidation was carried out and the stuccowork and paintings were restored (Smole, 1979). The part of the painting from the lunette on the chancel wall was repainted, although on this occasion somewhat unsuccessfully.

Restoration of the lunette on the chancel wall

The situation we were faced with at the start of the restoration was as follows: the general static condition was extremely poor, plaster had fallen away, and there were several cavities, which was probably the consequence of the fact that the present lunette occupies the area of a former Diocletian window; the painting was darkened across its entire surface because of dust and surface dirt; pulverisation and loss of the paint layer were present in large areas as a result of the loss of binder; some parts of the plaster were poorly attached to the wall, by means of unsuitable metal screws. The lower part of the painting, the work of

Leonardo Rigo, was done in the *fresco buono* (true fresco) technique, which is very durable, but as a result of long years of exposure to rain and sun after the First World War, when the building did not have a roof, the painting had faded and some of the paint layer had been washed away. The upper part of the painting, painted by Giovanni Moro after the First World War, was for the most part done in the *mezzo fresco* technique (also known as lime technique), with specific areas probably consisting of true fresco. Its paint layer was likewise very durable and had not been rubbed away by cleaning processes. The painting was later restored or overpainted at least three times, while the right-hand section, which fell away during the earthquake, consisted of brand-new painting which, even before starting work, we decided to remove in its entirety and reconstruct on the basis of surviving photographic documentation (Figure 1). A major problem when restoring the painting was presented by the paintings carried out after 1929, which were so extensive that it was not possible to distinguish clearly between the hands of the two artists. It was not until after the first attempts at cleaning and the completion of scientific tests that we were able to distinguish the two parts of the original painting, their quality and their state of conservation. The difference between the two artists was first evident in the nature of the plaster, since Rigo painted in the true fresco technique on smoothed plaster, while Moro, who used the lime technique, painted on more roughly made plaster. The main difficulty was represented by the join between the two paintings, since Giovanni Moro connected his part of the painting to the original by overpainting parts of the smoothed original painted plaster, which did not provide for good adhesion, with his lime technique. We carried out testing of two samples taken from the upper part of the lunette painting, which was done in its entirety by Giovanni Moro (Bešlagić, Kavkler, 2017). From analysis of the sample taken in the area of blue sky (GOM 2; Figure 2), it was clear that the plaster (level 1) had been covered with a thin layer of whitewash (level 2). FTIR spectroscopy confirmed that this layer contained calcium carbonate. It was followed by three layers of original pigment: light blue (level 3), then darker blue (level 4) (calcium carbonate, calcium sulphate and ultramarine blue were present in these two levels), then a layer of brown (level 5), which could have represented the glaze. In these layers we also detected protein and lipid, or egg tempera, which confirmed that Moro used a mixed technique. A layer of light grey paint (level 6) consisting of calcium carbonate, calcium sulphate dihydrate, calcium oxalate, some silicates and protein was applied to the layer of brown. This may represent a later overpainting.

Analysis of the sample taken from the green treetop (GOM 3; Figure 3) revealed that on the whitewash (level 1) there was a layer of light blue (level 2), in which we detected ultramarine blue, calcium carbonate and a little calcium sulphate dihydrate. A yellow-green paint layer had been

applied to the light blue, in all probability an overpainting (level 3). Using Raman and FTIR spectroscopy, we identified the following pigments, additives and impurities in this yellow-green paint layer: iron oxides, carbon black, albite, viridian, titanium dioxide, calcium carbonate, calcium sulphate dihydrate, dolomite, calcium oxalate, protein (egg tempera?).

After completion of the analyses and cleaning, the expert commission decided that in the final presentation of the painting, in those parts where the work of the two artists overlaps, priority would be given to the first phase of painting, for the following reasons: Leonardo Rigo worked in the true fresco technique, for which reason his layer of painting is the best preserved; the later overpaintings (including that done by Moro) were unclear and it was difficult to distinguish between them, while some were very visually intrusive; the second phase of the painting, done by Moro, was illegible in several places, while because of his technique of painting on dry plaster it was impossible to clean off later overpaintings, particularly at the point of contact with the older painting; the most suitable and high-quality source for the reconstruction of the whole of the right-hand part of the painting was a photograph from the immediate post-war period, when the painting was in its entirety the work of Leonardo Rigo. The commission decided that in the upper part of the painting, where Rigo's painting was destroyed during the war, the layer painted by Giovanni Moro would be presented. This part would need to be cleaned of dirt and unsuitable overpaintings as far as possible, after which the pigments in parts of Mary's drapery (sleeves) would need to be harmonised with the lower part, painted by Rigo. At this point of contact between the lower and upper parts of figure of Mary, an additional difficulty later revealed itself during the course of the work, namely that Giovanni Moro significantly changed this part of the scene. Not only did he effect an iconographic change (converting the originally tender and loving Our Lady of Succour into a severe Mary, Queen of Heaven seated frontally on a throne), but Moro elevated Mary considerably and almost entirely overpainted her garments.

All the overpaintings from the lower part of the painting were removed using pads soaked in a 10% solution of ammonium carbonate, while the cleaning of the upper part of the work was carried out gradually, since the overpaintings were very similar to the original technique. Overpaintings done with protein tempera were removed using Carbopol gel with added citric acid and triethanolamine. The gel was removed with silicon spatulas after drying. Swabs soaked in alcohol and acetone were used to remove acrylic overpaintings. The plaster was structurally joined to the brick using injection foam and an injection compound. The visible old screws were removed and all cracks and gaps in the plaster were filled with lime mortar and marble dust in a texture similar to the original. Chromatic integration was carried out using a stippling technique known as *pun-*

tegiato, to allow the missing parts to be reconstructed as faithfully as possible, although in an identifiable manner (Querini, 2017).

Reconstruction of the figural group on the right-hand side was done using a surviving photograph enlarged to a scale of 1 : 1. Cardboard sheets were then prepared for the transfer of the painting to the plaster. More stable silicate paints were used for the painting itself.

After completion of the restoration intervention, a large horizontal crack remained visible in the central section, since more extensive filling of its edges would have covered a larger part of the original painting. The crack, which is simultaneously a mute witness to the brief but extremely turbulent history of this religious mural, will be less visibly intrusive once more suitable internal lighting is installed (Figure 4).

Restoration of the stuccowork on the nave ceiling

After reviewing written and photographic documentation and examining the results of probes, the restorers were able to establish the original appearance of the nave ceiling, which was rebuilt in 1929. The stucco was made with lime and gypsum, coloured with a light yellow pigment and partly gilded. The fields between the stucco mouldings did not have the marmoration visible today, but were adorned by lighter decorations in the form of simple cartouches. Yet since the new decoration of the nave ceiling was "monotonous, because of its uniform colour, which destroyed the effect of the frescoes and stuccowork," the Franciscans decided in 1938 to commission new decoration. This was created by the painter Giovanni Pertot of Gorizia (Archives of the Kostanjevica Franciscan Friary, 1924–1947). The stuccowork was repainted in a light beige colour over the original layers, while the fields between the mouldings were given decoration in the form of marmoration and floral, tendril-like patterns. This layer was still extant at the start of the conservation-restoration intervention.

The expert commission decided that the last surviving layer on the mouldings and the fields between them would be presented. This would be conserved, cleaned, consolidated and retouched only in damaged areas or places subjected to unsuitable restoration in the past. The reasons for this were as follows: both layers of the paintings were extremely brittle, bonding was poor, it was practically impossible to uncover the lower layer without damaging it greatly (this was probably also consequence of the short interval between the creation of the two layers); the interior of the church has a harmonious effect with the present decoration and connects nicely to the sanctuary and other stucco mouldings lower down in the nave; an entry in the parish

chronicle states that less than ten years after the new nave ceiling was built, Giovanni Pertot was called upon to re-decorate it with stucco mouldings and painting, since the original new ceiling had seemed too boring. Accordingly, Pertot's decoration has a specific historical, testimonial value alongside its aesthetic value.

The results of tests on the sample taken from the stucco border of the lunette on the chancel wall revealed that a layer of ochre pigment (layer 2) was applied to a white stucco compound (layer 1). It was followed by the application of a lighter ochre paint layer (layer 3). The boundary between the two applications of pigment is not clearly visible in the stratigraphy of the sample in visible light, but is more visible in the stratigraphy of the sample done in ultraviolet fluorescence. Using Raman and FTIR spectroscopy, we identified the same materials in both paint layers. These were calcium sulphate dihydrate, calcium carbonate, calcium oxalate, red ochre and yellow ochre. We also identified a black carbon-based pigment in the lower ochre layer. Also worth mentioning is that the FTIR results revealed that the lower ochre layer contains more calcium sulphate dihydrate than calcium carbonate, while the upper light ochre layer contains more calcium carbonate than calcium sulphate dihydrate. On the basis of the FTIR spectra, we conclude that a protein component is also present in the upper light ochre paint layer (layer 3) (Bešlagić, Kavkler, 2017). There is no visible layer of dirt – patina – between the two paint layers, which confirms that the upper light ochre layer was applied shortly after the original ochre paint layer: not even nine years later.

All the surfaces of the stucco mouldings and marmoration were covered with a thick layer of dust and dirt (Figure 5). Not only that, but the paint layer was highly pulverised. The original gilding, which was made of gold leaf, was unsuitably restored at some stage, with the result that in some places bronze was applied over the gilding or in substitution of damaged gilding. This has oxidised over time. Unsuitable attempts at restoration were also made in the past on specific areas with marmoration, above all at points where the roof leaked. Some areas show characteristic changes resulting from the effect of rainwater, while in other areas the stucco compound was cracked (Figure 6).

We found that the framework of the stuccowork was made of reeds and lime mortar. Where holes in the stucco mouldings were large enough, we were able to inspect the gap between the stuccowork and the masonry of the vault using a small endoscope camera. We saw rusting nails fixed to the vault and, attached to them, what is probably galvanised wire, which is fastened to the reeds on the back of the stucco mouldings. In these areas, where there is an empty space between the stuccowork and the masonry ceiling, ventilation is also possible, which has a positive impact on the resistance of the materials.

The surfaces of the stucco mouldings were cleaned with brushes and a vacuum cleaner. The paintings were remo-

ved using swabs soaked in a solution of alcohol and acetone in a proportion of 30 : 70. In places it was necessary to use benzyl alcohol in gel form. The gilding was cleaned using buffer solutions of pH 8.5 (Figure 7). The unstable elements were fixed in place using vinyl adhesive, with glass fibres and gauze added to the adhesive as necessary. The entire surface was consolidated with 5% Aquazol 500 in a solution of alcohol and water in a proportion of 4 : 1, applied by air-brush, for two periods of 24 hours. Gaps were grouted with lime and gypsum mortar and mimetically retouched. Larger areas of missing gilding were re-gilded with 23³/₄ carat gold leaf affixed with mixtion (gold size) and then patinated by an application of bitumen of Judea. Smaller cracks and other damage were filled with gold dust.

Restoration of the paintings on the nave ceiling

The frescoes on the nave vaulting are among the better quality works by Giovanni Moro of Udine. The central place on the ceiling is occupied by a painting of the Coronation of Mary measuring 7.4 x 5 m (Figure 10), while the smaller medallions and stuccowork frames contain personifications and symbols that complement the main image with Marian iconography (Brecelj, 1989).

The painting technique is very similar to that used by the artist during the restoration or reconstruction of the painting on the chancel wall lunette (Bešlagić, Kavkler, 2018). The artist painted large *giornate* in the *fresco buono* technique and completed the shading and details in the *mezzo fresco* technique, for which he probably used milk of lime and egg tempera. The *mezzo fresco* parts have in places lost their final layer of paint. We identified at least two past restoration interventions and various overpaintings/retouching methods, one using chalk-based paints and another using acrylics and caseins. The entire surface was covered with a layer of dirt and soot, the paint layer had flaked in places, microscopic cracks were present and areas filled with putty during past interventions had in several places covered the original paint layer. Towards the southern end of the painting, metal screws similar to those in the lunette were present. These were used to fix the plaster to the wall following the earthquake in 1976 (Figure 9). Larger cracks were stable.

Cleaning the dirt from the chalk-based painting was carried out on almost 80% of the surface using Wishab sponges and then with natural sponges soaked in demineralised water. Cotton swabs soaked in acetone were used for the remaining acrylic-casein paintings (Figure 8). Consolidation of the paint layer was carried out using 5% Aquazol 200 in demineralised water applied with a brush via a single layer of Japanese paper. The process was repeated for two peri-

ods of 24 hours each. Those sections of plaster with cavities behind them were attached to the support by drilling small holes and injecting a plastic moulding compound. Smaller cracks were consolidated with Primal AC 33. Unsuitable fills were removed and replaced using a filler of a similar texture to the original plaster, consisting of lime and sand of varying granulation in a proportion of 1 : 3. Retouching was carried out using 1% Tylose and a *tratteggio* technique with colour equalisation (Querini, 2018).

New findings regarding the lunette painting

While the work was ongoing, the ZVKDS continued archival research with the help of the friary; this proved successful in that we obtained, in good time, the necessary photographic material from the Museo del Risorgimento in Rome to enable us to carry out an authentic reconstruction of the missing parts of the lunette painting on the chancel wall.

Detailed examination of the painting revealed an interesting “mistake” made by Giovanni Moro when repairing and completing the painting after the First World War. We found that one of the guardian angels in the group of figures to the left of Mary’s throne was missing its head. Why Moro did not paint this in is not known, and apparently no one had even noticed it until now. With the help of archival photographic documentation we reconstructed the missing head during the restoration (Figure 11).

During the phase of cleaning the painting and removal of later poorer quality overpaintings, a view of the surrounding hills was revealed beneath Mary’s feet: Sabotin (Sabotino) and Sveta Gora (Monte Santo) to the left of the tree trunk, and Škabrijel (Monte San Gabriele) to the right (Figure 13). Also clearly visible is the friary church on Sveta Gora, which however is so small that it can barely be seen with the naked eye from the nave floor. Its inclusion in the painting tells of the close connection between the two friaries. The Franciscans were expelled from Sveta Gora at the time of the Josephine reforms and moved to Kostanjevica in 1811 after 25 years of “exile” in Gorizia (Šrumpf, 2013).

During the actual restoration of the painting, all of us involved wondered about the significance of the dark blue vase with gold trim standing on one of the steps below Mary’s throne, to the left of the seated angel playing the lute. Since the vase held two white lilies, we assumed that these were painted as a Marian symbol (Figure 12). After the first phase of cleaning the paintings, however, it became apparent that there were originally three lilies and that the vase was not dark blue, but black.

In 1906 and 1907 Fr Stanislav Škrabec published in *Cvetje z vrtov sv. Frančiška* [“Flowers from the Gardens of St Fran-

cis”] a translation of the history of the church and friary at Kostanjevica written and published in 1848 by the Kostanjevica friar Chiaro Vascotti, along with an adaptation of additional material from later manuscripts left by Fr Vascotti. These writings contain an interesting and fairly detailed description of “a pair of exquisite Sèvres porcelain vases” which had been sent to Kostanjevica from Paris in 1854 by Charles, Marquis de Villette. These precious vases, mainly blue in colour and richly gilded, with gilded bronze handles in the shape of “merchchildren” and dedicatory inscriptions, were placed as funerary urns above what was then the tomb of the Bourbons, by the altar of Our Lady of Mount Carmel. It seems that after the coffins of the French nobles were moved into the crypt beneath the sanctuary, the vases remained by the altar. Even Fr Vascotti felt that this was no longer a suitable location for the vases. He writes that “The esteemed reader will perhaps believe that the right place for them was, in any case, on the High Altar, on either side of the noblest object that the church possesses, namely the Tabernacle. In the first place, there is sufficient empty space for them there – as though intentionally; secondly, those for whom the vases were intended are buried there below; and finally, the present Tabernacle was erected at the expense of the last of the dead royalty reposing beneath the altar” (Škrabec, 2002: 72–74).

The removal of the members of the French royal family to the tomb below the sanctuary was carried out at the wishes of the last of those buried there, Archduchess Maria Theresa of Austria-Este, Countess of Chambord, before her own death. We learn from *Cvetje z vrtov sv. Frančiška* that, as well as being instrumental in the building of her family’s crypt, the Countess of Chambord donated more than 15,000 florins for the renovation of the friary and church. This money was used to build a roof lantern above the sanctuary, create two lateral entrances to the sanctuary, clean the High Altar and build a new Tabernacle. The stuccowork in both sanctuary and nave was cleaned, repaired and regilded, a new stone lectern was installed and the entire church was “magnificently painted”, which is a reference to the entirety of the paintings with Marian scenes. The description of the painting in the lunette on the chancel wall is particularly interesting: “On the semicircular wall above the sanctuary entrance, the Mother of God with the Christ Child in her arms can be seen in a cloud. Behind her is a chestnut tree, which is a special symbol of this church. On either side, guardian angels accompany those they protect – the poor and unfortunate, widows and orphans – into Mary’s presence [...]. The painter who took on and largely completed this work for a suitable and not excessive price was Leonardo Rigo of Udine. His work is distinguished by beautiful, bright colours which make the paintings extremely attractive, and a perspective that shows us many things in an appropriately small space. These paintings will not be without faults, since no work of human hands ever can be, yet it may be said that, with them, the noble lady has pla-

ced a fine memorial on her tomb and that it would certainly have greatly pleased her, had she seen them” (Škrabec, 1885–1886: 213–215).

When reading the history of the friary, the new discoveries made during the restoration interventions led to an entirely new idea about the meaning of the black vase below Mary’s throne, which has probably already occurred to the attentive reader of the above lines. Since the painting was ordered by the last of the Bourbons, who was also the individual who ensured that a tomb fit for royalty was created beneath the sanctuary, she placed above this tomb a vase or, better, a funerary urn, from the mouth of which three lilies protrude, not as a symbol of Mary’s immaculateness, but as a symbol of the French royal family (Osojnik, 2018). The vases sent from Paris by the Marquis de Villette in 1854 contained bunches of lilies, as a symbol of the French royal family, and little white flowers called *Hesperis matronalis*, a species whose common names include mother-of-the-evening and which Fr Škrabec called *večernice* or “vesper flowers”. These were supposed to be placed in vases as a *memento mori*, a reminder of the inevitability of a death that was “all the more present in the mind of the giver, since he himself was, in a sense, the personified ‘evening’ of his family and name.” It may be that Leonardo Rigo added the black vase with the lilies to the painting of Our Lady of Succour at the request of the last of the Bourbons, who in this way placed a memorial on her grave and that of her ancestors, aware that her family name would die with her.

Conclusion

The restoration of the ceiling in the Church of the Annunciation in Kostanjevica was an extensive and demanding project which, over the course of two years, successfully concluded the first segment of restoration and repair work in the interior of the church. At the same time, this project is an introduction to the renovation of the entire church interior, which continues in 2019 with a conservation-restoration project regarding the restoration of the stuccowork on the choir gallery parapet and window jambs, which we have dated to the second half of the seventeenth century.

In response to the great interest shown by the local community in the restoration of the first part of the ceiling, the Nova Gorica regional unit of the ZVKDS decided to issue regular updates on progress in the form of an informative leaflet entitled *Kaj se dogaja zgoraj* [“What’s going on up there?”]. A total of eight updates were issued in this form. Numerous guided visits were organised for children, young people and adults during the course of the work, and a workshop on stuccowork was run during Lifelong Learning Week.

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Primož Pavlin

Bronastodobni depo iz Cajnarjev pri Cerknici

Kratki znanstveni prispevek
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Izveček

Konec petdesetih let prejšnjega stoletja so v Cajnarjah pri gradnji tovarne naleteli na bronastodobni depo, ki sta ga sestavljala dva jezičastoročajna srpa. Do danes se je ohranil samo en srp. Na podlagi primerjav iz datiranih sklopov sodi srp v mlajšo bronasto dobo, v Ha A1.

Uvod

Cajnarje so raztresena vas, ki leži v dolini Cerknishčice, osem kilometrov severovzhodno od Cerknice. V arheološki literaturi Cajnarje niso zabeležene, v *Register nepremične kulturne dediščine* so vpisane kot Cajnarje – arheološko najdišče (EŠD 10908). Na vzpetini nad vasjo, kjer stoji cerkev sv. Jurija s pokopališčem, naj bi bila prazgodovinska naselbina, v širši okolici pa naj bi bile odkrite tudi ostaline zgodnjerevnjeveškega značaja. Leta 2012 je bilo pri gradnji vodovoda zahodno in severno od cerkve izkopanih 20 manjših in ena večja sonda. Naleteli so predvsem na novodobno lončenino, gradbeni material, ostanke železnih predmetov, stekla in porcelana. Med najdbami je bil le en odlomek prazgodovinske lončenine, zato je obstoj prazgodovinskega naselja na tej vzpetini vprašljiv (Hofman: 2012).

Štiri leta prej so severozahodno od vasi pred gradnjo pomožnega kmetijskega objekta izvedli intenzivni površinski

in podpovršinski pregled. Pri tem so naleteli na tri odlomke prazgodovinske in tri odlomke rimske keramike ter več odlomkov srednjeveške in mlajše keramike (Nadbath, Lavrinc 2008).

Leta 1958 ali 1959 je danes že pokojni France Rudolf sodeloval pri gradnji industrijskega obrata, tovarne eteričnih olj.¹ Pri zemeljskih delih je naletel na zaklad, ki sta ga sestavljala dva ulita bronasta srpa. Eden od srpov se je izgubil, drugi, ki ga hrani najditelj sin Slavko,² je predstavljen v nadaljevanju. Objekt stoji na platoju, ki ga s treh strani obliva Cerknishčica. Pri terenskem pregledu so na njivah vzhodno od objekta našli bronastodobno keramiko.³

Opis, datacija, razprostranjenost

Bronast, skorajda v celoti ohranjen jezičastoročajni srp prekriva modrozeleno patino. Zaradi klepanja in brušenja je rezilo močno zoženo in obrabljeno. Na ročaju ima srp dve rebri, okrašeni z jamicami. Zunanje ročajno rebro sedlasto preide v hrbtno rebro, ki se razmeroma strmo dviga proti vrhu rezila srpa, najvišja točka ostrine rezila je višja od

1 Koordinate: 45°49' 47.18» S, 14° 27' 08.28» V.

2 Slavku Rudolfu se zahvaljujem za podatke o najdbi in za dovoljenje za objavo.

3 Za podatek se zahvaljujem Mitji Pergarju, ZVKD Ljubljana.

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višine sedlastega prehoda zunanjega ročajnega rebra v hrbtno rebro. Začetek hrbtnega rebra je okrašen z zarezi. Notranje ročajno rebro poteka naravnost proti hrbtnemu rebro. Mesto ulivanja je na hrbtu srpa. Dolžina srpa je 18 cm, višina 10,8 cm, širina ročaja 2,8 cm, teža 81 g (slika 1). Po tipologiji Primoža Pavlina sodi srp v skupino sedlastih srpov, v različico S2.2.A.0.1c (Pavlin 2014: 46). V Evropi je ohranjenih še trinajst srpov, ki tipološko ustrezajo srpu iz Cajnarjev. Njihova najdišča ležijo večinoma v jugovzhodnih Alpah in zahodnem delu Panonske kotline, po en primerik iz vira še iz srednje Bosne in Benečije v Italiji. Pomenljivo je, da je bilo kar pet srpov najdenih v Sloveniji (slika 2; seznam 1).

Seznam 1:⁴

A 78 – Lannach, Avstrija, Štajerska, depo, Ha A1 (Primas 1986: 110, t. 47: 774).

BH 26 – Motke, Bosna in Hercegovina, srednja Bosna, depo, stopnja 2 (Fiala 1896: sl. 10; König 2004: 212, t. 26A: 24).

H 093 – Blatno jezero – okolica, Madžarska, –, depo, horizont Kurd (Jahn 2013: 420, t. 10.5: 22).

H 109 – Öreglak, Madžarska, županija Somogy, depo, horizont Kurd (Mozsolics 1985: 164, t. 82: 9).

HR 44 – Dolina, Hrvaška, Slavonija, depo, horizont Veliko Nabrde (Schauer 1974: 106, sl. 7: 5).

I 03 – Celò, Italija, Furlanija – Julijska krajina, prov. Videm, depo, BR-BF 1 (Borgna 2007: sl. 3: 7).

I 20 – Reka Sile, Italija, –, posamezna najdba/vodna, – (Fasani 1984, sl. zgoraj desno na str. 593: v sredini).

SI 10 – Čermožiše, Slovenija, Štajerska, depo, horizont II (Čerče, Šinkovec 1995: 143, t. 46: 46).

SI 24 – Ljubljana – okolica, Slovenija, Ljubljana – okolica, posamezna najdba (?), – (Rant 2002: sl. 1).

SI 25 – Ljubljana XIV (na Špici), Slovenija, Ljubljana, posamezna najdba/vodna, – (Šinkovec 1995: 125, t. 144: 7).

SI 35 – Ljubljana V (med Zrnico in Pekovim grabnom), Slovenija, Ljubljana – okolica, posamezna najdba/vodna, – (Pavlin 2012: 264; t. 1: 3; Gaspari 2012: 188, t. 2: 9).

SI 49a – Cajnarje pri Cerknici, Slovenija, Notranjska, depo srpov, sestava neznana, – (sl. I).

SK 47 – Bratislava – okolica, Slovaška, –, depo, sestava ni zanesljiva, – (Furmánek, Novotná 2006: 89, t. 23: 394).

SR 15 – Futog, Srbija, Bačka, depo, faza II (Vasić 1994: 37, t. 20: 260).

Od trinajstih srpov jih osem izvira iz osmih depojev, eden je iz depoja, katerega sestava ni zanesljiva, štirje so posamezne najdbe. Vseh osem depojev je datiranih v mlajšo bronasto dobo, v Ha A1, oz. okvirno v 12. stoletje pr. n. št. V ta čas sodi torej tudi srp iz Cajnarjev.

⁴ Šifri najdišča, ki se ujema s šifro na karti razprostranjenosti, sledijo ime najdišča, država, geografska oz. upravna enota, vrsta najdbe, datacija in okrajšana literatura.

Sklep

Depo iz Cajnarjev se po svoji sestavi uvršča med depoje, ki so sestavljeni iz ene zvrsti predmetov (nem. *reine Hortfunde*), v našem primeru iz dveh srpov. Poudariti je treba, da so depoji, ki jih sestavljajo le plavutaste sekire, igle, meči ter uhate in tulaste sekire, ne le regionalno omejeni, ampak se območja njihove razprostranjenosti izključujejo. Zgostitev enozvrstnih depojev s plavutastimi sekirami je v južni Nemčiji, depojev z iglami v zahodnih Karpatih, depojev z meči v zahodnih Karpatih ter zgornjem in srednjem Potisju, depojev z uhatimi sekirami v severovzhodnem delu Karpatske kotline in depojev, ki jih sestavljajo tulaste sekire, v jugovzhodnem delu Karpatske koline in na centralnem Balkanu. Predmeti v takih depojih skoraj nikoli niso prelomljeni ali omembe vredno poškodovani (Hansen 1994: 359, sl. 210). Tudi naš srp je ohranjen skoraj v celoti. Karta najdišč depojev, ki jih sestavljajo izključno jezičastoročajni srpi z nepreluknjanim ročajem, kaže, da so, če dodamo še Cajnarje, od 15 najdišč tri severno od Alp in dve v Alpah, ostala ležijo jugovzhodno od Alp. Njihova zgostitev je v vzhodni in južni Sloveniji in v zahodni Hrvaški, kjer je skoraj polovica vseh najdišč (Pavlin 2017: sl. 5³). Na ta način smo dobili še eno potrditev, da so enozvrstni depoji (v našem primeru jezičastoročajnih srpov z nepreluknjanim ročajem) omejeni na določena območja in da se ta medsebojno izključujejo.

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⁵ Na sliki pomotoma ni počrnjena pika pri št. 21 (Oberriet-Motlingerberg).

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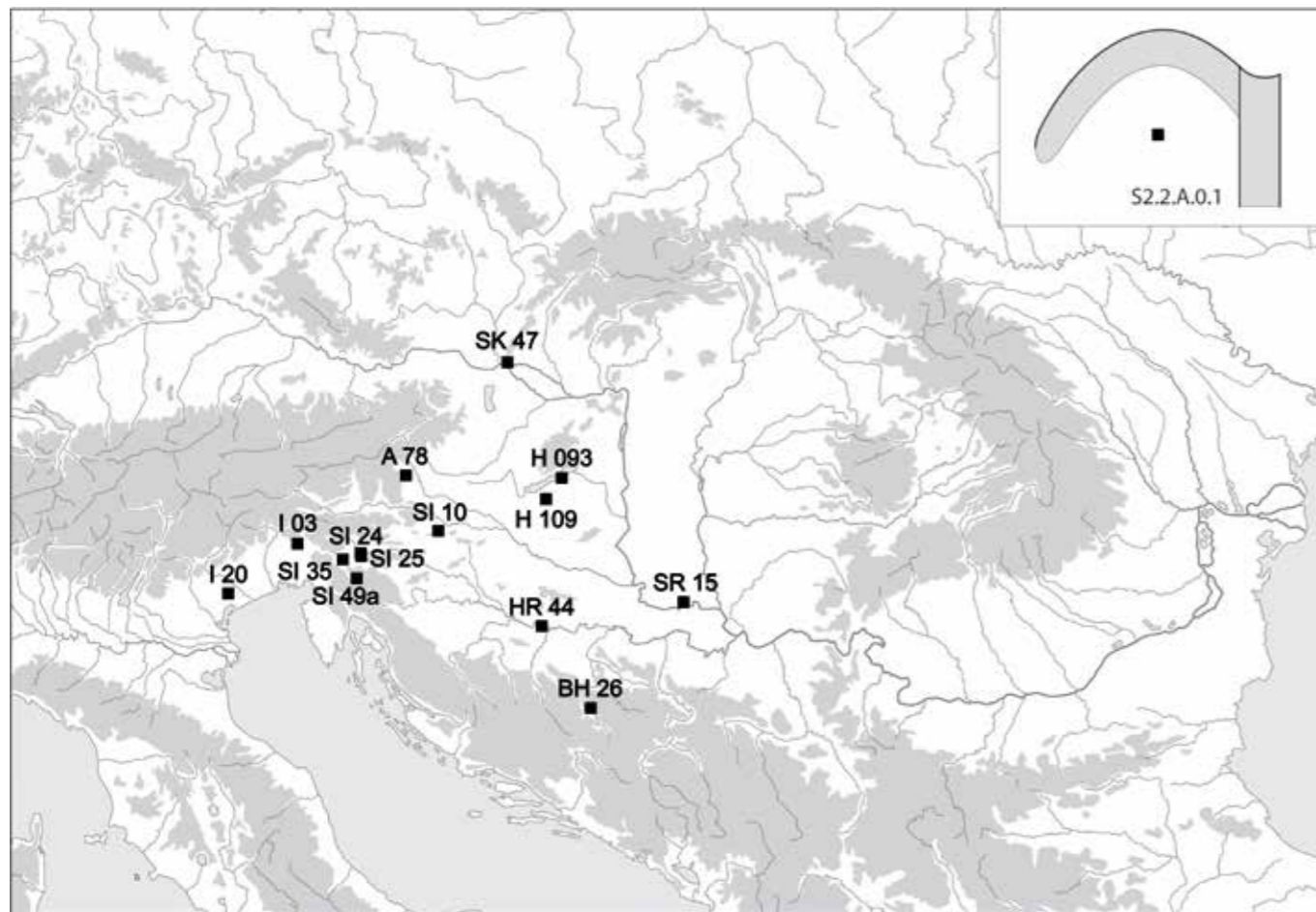
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1. Bronast srp iz Cajnarjev pri Cerknici (risba: Tamara Korošec, foto: Slavko Rudolf)
1. Bronze sickle from Cajnarje near Cerknica (drawing: Tamara Korošec, photo: Slavko Rudolf)



2. Razprostranjenost sedlastih jezičastoročajnih srpov različic S2.2.A.0.1a,b,c po Pavlinu
2. Distribution of saddle-shaped tanged sickles of variants S2.2.A.0.1a,b,c per Pavlin

Primož Pavlin

A Bronze Age hoard from Cajnarje near Cerknica

Short scientific article
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Abstract

In the late 1950s a Bronze Age hoard consisting of two tanged sickles was discovered during construction of a factory in Cajnarje. Only one sickle has survived to the present day. Comparisons from dated sets of finds place the sickle in the late Bronze Age, in Ha A1.

Introduction

Cajnarje is a scattered village in the valley of the Cerknjiščica, eight kilometres north-east of Cerknica (SW Slovenia). Cajnarje is not recorded in archaeological literature and is entered in the *Register of Immovable Cultural Heritage* as Cajnarje – archaeological site (EŠD 10908). There is believed to have been a prehistoric settlement on the hill above the village, where the church (dedicated to St George) and cemetery stand today. Remains of an early medieval character are said to have been discovered in the wider surrounding area.

In 2012, during construction of a water main, 20 small trial trenches and one large trial trench were dug to the west and north of the church. Finds from these trenches largely consisted of modern-era pottery, construction material and remains of iron, glass and porcelain objects. There was only one fragment of prehistoric pottery among the finds, for which reason the existence of a prehistoric settlement on this hill is questionable (Hofman 2012).

Four years earlier, before construction of a farm building, an intensive surface and subsurface inspection was carried out to the north-west of the village. This resulted in the

finding of three fragments of prehistoric ceramics, three fragments of Roman ceramics and several fragments of medieval and later ceramics (Nadbath, Lavrinc 2008). In 1958 or 1959 France Rudolf (since deceased) was involved in the construction of an industrial plant – a factory producing essential oils.¹ During the earthmoving operations he came across a hoard consisting of two cast bronze sickles. One of these sickles has since been lost. The other, kept by the finder's son Slavko,² is presented below. The factory building stands on a plateau that is washed on three sides by the Cerknjiščica. A field survey carried out in the fields to the east of the building resulted in the discovery of Bronze Age ceramics.³

Description, dating, distribution

The almost entirely preserved bronze tanged sickle is covered by a blue-green patina. The blade is considerably narrowed and worn as a result of sharpening and grinding. The sickle has two tang ribs decorated with alveolae and a saddle-shaped transition between the outer tang rib and the dorsal rib, which rises relatively steeply towards the top of the blade. The highest point of the cutting edge of the blade is higher than the height of the saddle-shaped transition of the outer tang rib to the dorsal rib. The beginning of the

1 Coordinates: 45° 49' 47.18» N, 14° 27' 08.28» E.
2 My thanks go to Slavko Rudolf for providing me with information about the find and allowing me to publish it.
3 Information provided by Mitja Pergar of ZVKD Ljubljana.

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dorsal rib is decorated with notches. The inner tang rib runs in a straight line towards the dorsal rib. The casting point is on the back of the sickle. The sickle is 18 cm long and 10.8 cm high and weighs 81 g. The width of the tang is 2.8 cm (Fig. 1).

Under the typology created by Primož Pavlin, the sickle belongs to the group of saddle-shaped tanged sickles and is classified as variant S2.2.A.0.1c (Pavlin 2014: 46). Across Europe there are a further 13 surviving sickles that correspond typologically to the Cajnarje sickle. For the most part these are from sites in the Southern Limestone Alps and the western part of Pannonian Basin. One specimen comes from central Bosnia and another from the Veneto region of Italy. It is significant that five of the sickles have been found in Slovenia (Fig. 2; List 1).

List 1:⁴

A 78 – Lannach, Austria, Styria, hoard, Ha A1 (Primas 1986: 110, Pl. 47: 774).

BH 26 – Motke, Bosnia and Herzegovina, Central Bosnia, hoard, phase 2 (Fiala 1896: Fig. 10; König 2004: 212, Pl. 26A: 24).

H 093 – Lake Balaton – environs, Hungary, –, hoard, Kurd horizon (Jahn 2013: 420, Pl. 10.5: 22).

H 109 – Öreglak, Hungary, Somogy County, hoard, Kurd horizon (Mozsolics 1985: 164, Pl. 82: 9).

HR 44 – Dolina, Croatia, Slavonia, hoard, Veliko Nabrde horizon (Schauer 1974: 106, Fig. 7: 5).

I 03 – Celò, Italy, Friuli-Venezia Giulia, Province of Udine, hoard, BR-BF I (Borgna 2007: Fig. 3: 7).

I 20 – River Sile, Italy, –, individual find/water find, – (Fasani 1984, Fig. top right on page 593: centre).

SI 10 – Čermožiše, Slovenia, Štajerska, hoard, horizon II (Čerče, Šinkovec 1995: 143, Pl. 46: 46).

SI 24 – Ljubljana – environs, Slovenia, Ljubljana – environs, individual find (?), – (Rant 2002: Fig. 1).

SI 25 – Ljubljana XIV (at Špica), Slovenia, Ljubljana, individual find/water find, – (Šinkovec 1995: 125, Pl. 144: 7).

SI 35 – Ljubljana V (between the Zrnica and Pekov Graben streams), Slovenia, Ljubljana – environs, individual find/water find, – (Pavlin 2012: 264, Pl. 1: 3; Gaspari 2012: 188, Pl. 2: 9).

SI 49a – Cajnarje near Cerknica, Slovenia, Notranjska, sickle hoard, composition unknown, – (Fig. 1).

SK 47 – Bratislava – environs, Slovakia, –, hoard, composition not reliably documented, – (Furmánek, Novotná 2006: 89, Pl. 23: 394).

SR 15 – Futog, Serbia, Bačka, hoard, stage II (Vasić 1994: 37, Pl. 20: 260).

Of the 13 sickles, eight are from eight hoards, one is from a hoard whose composition is not reliably documented

and four are individual finds. All eight hoards are dated to the late Bronze Age, to Ha A1, in other words to around the twelfth century BC. The sickle from Cajnarje thus also belongs to this period.

Conclusion

In terms of its composition, the Cajnarje hoard is classified as a hoard consisting of a single type of object (known in German as a *reine Hortfunde* or “pure hoard”), in our case two sickles. It should be emphasised that hoards consisting only of winged axes, needles, swords, shaft-hole axes and socketed axes are not only regionally limited, but the areas of their distribution are exclusive. There is a concentration of “pure” hoards with winged axes in southern Germany, hoards with needles in the western Carpathians, hoards with swords in the western Carpathians and the upper and central parts of the basin of the river Tisa, hoards with shaft-hole axes in the north-eastern part of the Carpathian Basin and hoards consisting of socketed axes in the south-eastern part of the Carpathian Basin and the central Balkans. The objects in such hoards are almost never broken or significantly damaged (Hansen 1994: 359, Fig. 210). Our sickle is likewise preserved almost intact. The map showing the sites of hoards consisting exclusively of tanged sickles with unperforated tangs indicates that, if we include Cajnarje, three of the 15 sites are north of the Alps, two are actually in the Alps and the remainder lie south-east of the Alps. They are concentrated in eastern and southern Slovenia and western Croatia, where almost half of all the sites are located (Pavlin 2017: Fig. 5⁵). In this way, we have obtained a further confirmation that single-type “pure” hoards (in our case of tanged sickles with unperforated tangs) are limited to specific areas and are mutually exclusive.

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⁴ The site code, which corresponds to the code on the distribution map, is followed by: site name, country, geographical or administrative region, type of find, dating, abbreviated literature.

⁵ The black dot by number 21 (Oberriet-Motlingerberg) has been inadvertently omitted from the figure.

Ana Plestenjak, Neža Čebtron Lipovec

Izhodišča prenove skladišč soli Monfort in Grando v Portorožu

Strokovni članek

COBISS 1.04

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72:719(497.4)Portorož

Ključne besede: industrijska dediščina, nova raba, ocenjevanje ustreznosti, Monfort, Grando, Portorož

Izvod

Prispevek obravnava skladišči soli Monfort in Grando, spomenika lokalnega pomena v Portorožu, ki sta bila v obdobju 2017–2020 predmet obravnave v okviru čezmejnega projekta REFREsh. Predstavljamo razvoj objektov, njihove značilnosti in stanje ter upravljaljske vidike. Posebej pa predstavljamo metodo ocenjevanja ustreznosti predlaganih novih rab glede na individualne omejitve posameznega objekta. Na osnovi tega predstavljamo izbor ustreznih novih funkcij, ki združujejo tako željo po razvoju kulturne in kreativne industrije v občini kot tudi potrebe lokalnega prebivalstva.

Uvod

Prispevek obravnava možnosti vključevanja kulturne in kreativne industrije v oživiljanje opuščanih skladišč soli Monfort in Grando v Fizinah v Portorožu, ki sta bili predmet raziskav v projektu REFREsh – *Rural revitalisation for cultural heritage* (2017–2020, Interreg Central Europe). Osrednja tema prispevka je metodologija ocenjevanja ustreznosti novih vsebin glede na značilnosti in stanje objektov.

Gre za masivna objekta z dolgimi pravokotnimi tlorisi, zgrajena v začetku 19. stoletja. Razlog za izgradnjo je bila povečana proizvodnja soli in posledično potreba po njenem skladiščenju v centralnih državnih skladiščih. Vse od postavitve do nedavnega sta objekta služila prvotnemu namenu – skladiščenju soli. V Monfortu je bilo skladiščenje

povsem končano leta 2012. Danes je funkcija objekta daleč od prvotne. V eni kampati je trgovina Mercator, drugo imajo v uporabi Obalne galerije Piran, osrednji dve lastnik (Občina Piran) občasno oddaja v najem za kulturne prireditve, vzhodno pa ima v uporabi Pomorski muzej Sergeja Mašera v Piranu, ki tu hrani in predstavlja zbirko čolnov in bark. Sosednji objekt, Grando, še vedno služi kot skladišče. Prostori se oddajajo različnim uporabnikom. Le osrednja kampata, katere najemnik je SOL, Soline, d. o. o., še vedno služi prvotnemu namenu, v njej se skladišči in pakira sol.

Masivna objekta, ki ležita ob obalni promenadi, ki povezuje turistična bisera Portorož in Piran, zavzemata eminentno pozicijo na slovenski obali. Z velikimi, pokritimi in med seboj povezanimi prostori nudita številne možnosti boljše uporabe za sedanjo družbo. V *Strategiji razvoja turizma v občini Piran med letoma 2009 in 2015* (Občina Piran, 2009) je navedeno, da je v občini sicer veliko število namestitvenih kapacitet tudi visoke kakovosti, »vendar pa gostom ne morejo ponuditi popolnega in bogatega doživetja destinacije zaradi pomanjkanja raznovrstne in atraktivne ponudbe različnih produktov in programov v sami destinaciji«. Strategija dodatno poudarja, da »niso izkoriščene možnosti, ki jih nudi destinacija s svojimi naravnimi in kulturnimi danostmi« (Občina Piran, 2009: 6).

V tem kontekstu skladišči omogočata razvoj številnih pannonog, ki bi ponujale zanimiva doživetja in nadgrajevale turistično ponudbo s kulturnimi in dediščinskimi vsebinami. Zato Občina Piran želi prostorom nameniti novo funkcijo, ki bo trajnostno naravnana in hkrati tudi rentabilna. V re-

vitalizacijo bi rada vključila kreativno industrijo, saj v njej prepoznavna dodana vrednost. Zato je bila v okviru projekta REFREsh preverjena možnost preoblikovanja tretje kampate skladišča Monfort v kulturno-zabavno središče, namenjeno večjim prireditvam, kar je bilo v okviru projekta tudi izvedeno. Na celotni slovenski obali je namreč izrazito pomanjkanje prostorov za večje javne prireditve. Na delavnicah z lokalnimi deležniki, izvedenih v okviru projekta, pa se je pokazalo, da tudi lokalna skupnost in lokalna društva ter nevladne organizacije potrebujejo prostore za delovanje, ki bi jih prav tako lahko nudili skladišči. Tako je bila v okviru projekta REFREsh pripravljena tudi študija možnosti novih, v lokalno skupnost usmerjenih vsebin za sosednje skladišče Grando.

V prispevku zato predstavljamo različne možnosti uporabe obeh skladišč, ki smo jih preverili s pomočjo posebej prilagojene metode vrednotenja. Po predstavitvi značilnosti, razvoja ter rabe in upravljanja objektov analiziramo več zelenih novih funkcij.

Glavne značilnosti objektov

Stavbi sta zgrajeni na utrjeni ploščadi, postavljeni na morsko dno, ki se proti morju zaključuje s kamnitimi pomoli, proti severu pa nadaljuje v strm teren. Z vzpenjanjem terena se začne območje stanovanjskih hiš. V smeri proti Bernardinu območje meji na plažo, ki se nadaljuje do hotelskega kompleksa. V smeri proti Portorožu se nadaljuje zidana obala, ki nima izrazite funkcije razen te, da je s svojo ureditvijo postala del obalne promenade, ki se ravno v območju skladišč soli prekine. Starejše in večje skladišče soli, zgrajeno med letoma 1824 in 1828, so sprva imenovali Fizine, kasneje pa se ga je zaradi velikosti prijelo ime Grando. Zahodno leži manjše in nekoliko mlajše skladišče Monfort. Debeli zidovi objektov so zgrajeni iz izklesanih blokov peščenjaka in nagnjeni navznoter, da so lahko zdržali pritisk soli iz notranjosti. Postavljeni so na lesene pilote, zabite v morsko dno. Grando je podolgovata pravokotna, zelo enostavno oblikovana stavba (sliki 1 in 2). Glavni vertikalni sistem objekta tvorijo masivni zidovi iz kamnitih blokov peščenjaka, ki se z višino ožijo. V spodnjem delu je debelina zidu 250 cm, v zgornjem delu pa približno 195 cm. Dimenzije objekta so 186 x 29 m. Sestavljajo ga štiri kampate oz. prekat. Prva in zadnja kampata sta daljši (vzhodna 83,4 m, zahodna 44,45 m), sredinski sta krajši (22,8 x 22,9 m). Objekt ima na notranji strani nosilne zidove ojačane s slopi, ki se razširijo v prostor za dober meter. Notranje nosilne stene so različno debele (zahodna je debela 2,8 m, debelina ostalih dveh pa je 1,81 m). Salonitna streha skladišča je dvokapna, jugovzhodni del je zaključen s trokapnico. Kota venca je približno 8 m. Višina objekta znaša 11 m.

Okolica objekta je asfaltirana, objekt je umeščen med cesto in pomolom. Na severni, cestni strani takoj ob objektu je

speljan pločnik ob cesti. Del obale pred Grandom se zaključuje z dvema manjšima pomoloma na vsaki strani objekta in večjim pontonskim pomolom pred vhodom v drugo kampato. Ta je bil zgrajen leta 1983. Na njem so pristajale večje ladje, ki so pretovarjale sol. V ta namen je bil na fasado dodan sistem tekočega traku z vsemi pripadajočimi elementi, ki je omogočal nakladanje soli z ladje v skladišče. Sistem tekočega traku je bil nameščen tudi na ostrešje v notranjosti in je potekal po celotnem objektu.

Skladišče Monfort (sliki 3 in 4) je prav tako masiven pravokoten objekt velikosti 20,11 x 156,52 m, zgrajen med letoma 1838 in 1858. Zunanjo podobo Monforta odlikuje arhitekturno oblikovanje v klasičnem slogu. Južna in severna fasada imata po pet rahlo navzven izstopajočih delov z vertikalnimi pravokotnimi nišami, ki si sledijo v enakomernem ritmu in se na vrhu trikotno zaključujejo. Na morski strani so v nišah vrata, na nasprotni, severni strani objekta pa so niše slepe. Na južni, morski strani je eno (osrednje) od trikotnih čel zamenjal zidec nad vencem z napisom Monfort. Vse fasade povezuje kamnit strešni venec.

Prvotno je bil objekt z močnimi zidovi razdeljen na pet enako velikih prostorov, t. i. kampat, ki so imeli vsak po dvoje dvokrilnih lesenih vrat, postavljenih ena nad drugimi. Služila so tako za nalaganje soli kot stalnemu prezračevanju, ki je potrebno pri skladiščenju soli. Med drugo svetovno vojno je bila zahodna kampata delno porušena in pozidana nazaj le do polovice višine objekta. V njej je danes trgovina Mercator. Na vzhodno stranico objekta je prislonjen manjši prizidek.

Streha skladišča je dvokapna, jugovzhodni del je zaključen s trokapnico. Ostrešje skladišča je v osnovi še prvotno. Nad portali (funkcionalnimi in slepimi) so vgrajene strešne odprtine s polkrožnim oknom. Leta 2014 je bila zamenjana valovita salonitna streha z novo opečno kritino. V nivoju strešin so bila na severni strani dodana prosojna strešna polnila – strešna okna. Stene so bile v preteklosti do višine venca obložene z lesenimi deskami (slika 4). Obloga je bila z žebli pritrjena na lesene lege v zidovih, ki so potekale vzdolž zidov, po višini pa so bile lege med seboj razmaknjene na približno 100 cm. Te obloge so bile v večini prostorov odstranjene, ohranjene (oz. obnovljene) so le v tretji in četrti kampati. V drugi kampati so bile odstranjene, tako je zdaj vidna kamnita zidava (slika 5). Na predelnih stenah med prostori so preprosta dvokrilna lesena vrata. Skladiščni prostori (kampate 1–4) imajo tla obdelana v zalikanem betonu / asfaltu /, ki sega do višine 25 cm lesenih slopov. Zaliti so tako slopi, na katerih stoji strešna konstrukcija, kot tudi lesena podkonstrukcija, na kateri stojijo omenjeni slopi. Površina ni ravna.

V peti kampati (trgovina) je strešna konstrukcija novejša (narejena po drugi svetovni vojni). Princip postavitve je podoben, le izvedba je drugačna. Čez kampato je položenih 12 elementov strešne konstrukcije. Leseno konstrukcijo sestavljajo osrednji steber (20 x 20 cm), ki podpira slemensko lego (20 x 20 cm), špirovce podpirajo kapna (25 x 25 cm),

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vmesna in slemenska lega (20 x 20 cm), razbremenitvi obtežbe špirovcev pa pomagajo še trikotna razpirala (20 x 20 cm). Čez špirovce so položene deske in kritina iz valovitih salonitnih plošč. Kampata je z leseno predelno steno razdeljena na trgovino in več manjših skladiščnih prostorov, pisarn s sanitarijami itd. Tla so pretežno obdelana v keramiki, le pisarne imajo položen parket. Stene so ometane, opleskane ali obložene s keramiko. Strop je lesen, v trgovini je dodan spuščeni montažni strop. Streha vzhodnega prizidka je enokapna. Tla so obdelana v teracu (hodnik, čajna kuhinja), v pisarnah je položen parket, v garderobah in sanitarijah pa keramika. Stene so ometane in opleskane ali oblečene s keramiko. Okna in polkna so lesena.

Okolica objekta je asfaltirana. Na severni, cestni strani takoj ob objektu je pločnik. Sledi zeleni pas, posajen z nizkim okrasnim grmičevjem in visokimi drevesi – cipresami, zaključuje ga pločnik ob cesti. Na vzhodni in zahodni strani so urejena parkirišča, na južni strani pa je kamnita ploščad, prekrita z asfaltom.

Zgodovinski razvoj objektov

V času Napoleonovih Ilirskih provinc se je začelo na severnoistrski obali še intenzivneje pridelovati sol kot prej. To je privedlo tudi do rasti Sečoveljskih solin, ki so kmalu po letu 1814 dosegle sedanjo velikost. Povečana proizvodnja je narokovala gradnjo novih centralnih skladišč. Načrte zanje so večinoma pripravili že Francozi, zgradili pa so jih Avstrijci. Po zgraditvi prvega večjega skladišča piranske soli, skladišča Antenale v Fasani (zgrajeno leta 1822, porušeno leta 1962), je leta 1824 predsedstvo Solnega konzorcija izvedlo natečaj za izgradnjo še enega novega skladišča, ki naj bi stalo v Fizinah. Od sedmih prispelih projektov je bil izbran projekt arhitekta Signorinija. Po njem so istega leta v Fizinah zgradili novo skladišče, poimenovano *Magasen grando* ali *Magasen novo* (slika 6). Dela je izvajal gradbenik Francesco Bracciadoro, ki je našel podizvajalce, zidarje iz Senja in Bakra na Hrvaškem. V štirih mesecih je bilo narejeno skladišče v velikosti 132,72 x 22,75 m. Čeprav je bilo sprva predvidenih četvero vrat na morsko stran in dvojje ob straneh, je Bracciadoro na morsko stran naredil petero vrat in nobenih stranskih (Bonin, 2018: 16). Zato je bilo dodatno treba narediti še dvojje stranskih vrat, nad katerimi sta bili tudi dve okrogli okni. Poleg tega sta bili narejeni tudi dve predelni steni (ibid.). Dva manjša prostora sta lahko prevzela po 12.600 stotov (630 ton) soli, večji pa 225.500 stotov (11.275 ton). Zaradi premajhne kapacitete je leta 1826 c.-kr. direkcija za soline za Primorsko potrdila gradnjo prizidka za dodatnih 6000 modijev soli (pribl. 5208 ton) (ibid., 20). Načrt je pregledal inž. E. Vorbeck in zaradi simetrije določil podaljšanje objekta za 23 klafter in 2 čevlja (44,09 m), tako da je prizidek lahko prevzel še 7900 modijev soli. Ta prizidek je bil namenjen kvalitetnejši soli in naj bi imel leseno oblogo.

Tudi prizidek, ki je bil dodan na zahodno stran objekta, je gradil Bracciadoro. Zidarji so delo slabo opravili, saj jih Bracciadoro ni nadzoroval (Benčič et al., 2014). Ko so prišli skoraj do strehe, se je podrla severna stena, južna pa se je razprla. Pri tem je bilo poškodovanih več delavcev (ibid., 22). Prišli so inšpektorji iz Trsta in Gradca in ugotovili, da je bila gradnja zelo površna, da se je pri zidavi uporabljalo nečisto kamenje, malta pa se je mešala s slano vodo, zaradi česar se ni sušila. Poleg tega so stene postavili celo izven temeljev. Goljufali so tudi pri gradnji ploščadi, ki naj bi bila v celoti iz apnencev, a so za sredico uporabili peščenjak (ibid., 23). Delavci so morali vse stene porušiti in začeti znova, Bracciadoro je plačal kazen, inšpektorji pa so poslali navodilo, da je treba pri gradnji uporabljati samo sladko vodo. Skladišče je bilo dokončano novembra 1828 (ibid., 26). Objekt je skorajda nedotaknjen ostal do leta 1968 oz. 1983.

Skladišče Monfort je bilo domnevno zgrajeno leta 1838 zaradi velike potrebe po dodatnem skladiščenju državne soli. V času gradnje je namreč vzhodno od njega že stalo skladišče Grando, ki pa ni zagotavljalo dovolj prostora za vso sol. Dela je izvajalo podjetje Innocenzo Turrini iz Trsta (Benčič et al., 2014). Originalni načrti objekta niso ohranjeni, obstaja pa načrt sanacije iz leta 1858 (slika 7), ki ga hrani Državni arhiv v Trstu. Jugozahodna stena objekta in obala sta se začeli posedati, zato so jo med letoma 1858 in 1859 zaradi posedanja morali sanirati, kot je razvidno iz načrta sanacije. Verjetno je bila v času sanacije nad vrata osrednje kampa-te postavljena tudi plošča z napisom Monfort. Zakaj to ime, ni povsem jasno. Možno je, da je skladišče dobilo ime po Mauriziu Manfroniju Nobile Monfortu, ki je leta 1832 postal finančni pomočnik v Trstu, zatem pa je napredoval. Flavio Bonin¹ (ustno) domneva, da je obnovil skladišče in je to zaradi zaslug prevzelo njegovo ime.

Po izgradnji skladišča Monfort je bila poleg njega postavljena še manjša zgradba, ki so jo imenovali *casel*. V njej je imel svoj urad obalni vodja. Kje je stala, ni povsem jasno. Objekt je danes bodisi porušen bodisi skrit v masi novejšega prizidka od vzhodni fasadi skladišča Monfort.

Med drugo svetovno vojno in po njej je Monfort doživel nekaj sprememb. Med vojno je bila zahodna kampata objekta porušena, ko je bil julija 1944 bombardiran (Knez, 2014: 19) hangar hidroavionov, ki je stal zahodno od objekta. Kasneje je bila ta kampata ponovno pozidana, vendar le do polovične višine preostalega objekta. Po vojni je bil na vzhodnem delu prizidan še en prizidek, ki je povezan z vzhodno kampato. V njem so bili prostori solinske uprave. V vzhodni kampati je bil vzhodni del skladišča Monfort prezidan. V pritličju so bile v njem urejene garderobe in sanitarije za zaposlene, v nadstropju pa arhiv. Poleg zidane medetaže je bil v kampati postavljen tudi kiosk, izdelan iz mavčno-kartonskih plošč, ki je služil kot informacijska pisarna. Na ploščadi je na mestu sedanjega pomola pred Grandom do leta 1968 stal

¹ Kustos za starejšo zgodovino pomorstva v Pomorskem muzeju Sergeja Mašera, Piran.

star, lesen pomol (Naš glas, 1983: 7), ko ga je močno neurje dokončno uničilo. Na njem je iztovor soli potekal ročno s primitivnimi napravami in ob velikem fizičnem naporu solinarjev. Po zrušitvi pomola so vso sol (tudi »uvoženo«, iz Kopra in Umaga) privažali s tovornjaki in jo vsipali v vsipne koše, ki so bili nameščeni ob morski strani objekta.

V skladiščih soli se je proizvodni proces v celoti mehaniziral šele po letu 1983 oz. 1984. Takrat so ob skladišču Grando zgradili nov pomol (SGP Nova Gorica s kooperanti), ki naj bi v poletnih mesecih služil za »utovor oziroma iztovor avtomobilov in čolnov s potniških ladij«. Postavljen je bil tudi morski žerjav za raztovor soli – tako je bilo moč pretovoriti 100 ton soli v eni uri (Naš glas, 1983: 7). Sočasno so sanirali strešno konstrukcijo in na strop Granda namestili pretovorni trak. Pretovor soli je po novem z ladij preko žerjava potekal na zavarovanem traku 5 m visoko. Dodatno so v tretji kampati skladišča Grando uredili prostore za mletje, oplemenitenje in pakiranje morske soli ter za shranjevanje embalaže in gotovih izdelkov. Do takrat so bili pakirni stroji v ta isti objekt neprimerno nameščeni, električne inštalacije so bile dotrajane, prostori za pakiranje v zimskem času niso bili ogrevani in prezračevani, kompresorska postaja je bila neurejena.

Leta 2014 je bilo skladišče Monfort delno obnovljeno. Portale na morski strani so novo ometali, dotrajana salonitna kritina je bila zamenjana s korci, nameščen je bil nov žleb. Medetažo v vzhodni kampati je 23. aprila 2014 uničil požar, zato je Občina Piran 2017 izvedla javno naročilo, ki je zajemalo izvedbo konstrukcijskih elementov za namen ureditve informacijskega centra. Rekonstrukcija se je začela leta 2018 (v okviru evropskega projekta Mala barka) s prenovo celotnega vzhodnega predela, ki naj bi v prihodnje služil kot informativni center (PIA Studio, 2017).

Status in družbeni pomen spomenika

Skladišče Monfort in sosednje skladišče Grando sta bili 2. decembra 1983 z *Odlok o razglasitvi kulturnih in zgodovinskih spomenikov na območju občine Piran* (Uradne objave (Primorske novice), št. 26/83–379, 3/2009) razglašeni za kulturni spomenik lokalnega pomena. Objekt je skupaj s sosednjim Grandom vpisan v Register kulturne dediščine pod evidenčno št. 7207 (slika 8).

Skladišče Monfort in vzhodno ležeče skladišče Grando imata velik pomen z zgodovinskega in znanstvenega (razvojno-tehničnega) vidika, saj predstavljata zgodnjo industrijsko dediščino. Gre za skladišča soli velikih dimenzij s specifično gradnjo, ki je bila potrebna zaradi funkcionalnosti. Njuna impozantna gradnja je bil že v času postavitve velik tehnični dosežek. Dodatno sta sama oblika in postavitve podvrženi funkciji skladiščenja razdrobljenega tovara (soli) v velikih

količinah. Oba objekta sta že od izgradnje dalje s svojo monumentalnostjo zaznamovala obalni prostor in sooblikovala kulturno krajino med kopnim in morjem. Monfort se ponaša tudi z nekaterimi estetskimi elementi (niše, trikotni strešni zaključki napis, strešni venec).

Skladišči soli sta pomemben del sklopa Sečoveljskih solin. Od vseh nekdanjih solin v Tržaškem zalivu so ohranjene in v uporabi le Piranske (Sečoveljske). Med vsemi skladišči pa sta do nedavnega prvotnemu namenu služila le Monfort in Grando. Kot taka ostajata dragocena pričevalca o nekdanjem tradicionalnem gospodarstvu. S svojo monumentalnostjo sta simbol solinarske dejavnosti, ki je bila dolga leta pomemben sestavni del življenja in dela Pirančanov ter predstavlja pomemben del identitete lokalnega prebivalstva. Solinarstvo je bilo za Piran poleg ribolova in poljedelstva najpomembnejša gospodarska panoga. Z njim so povezane številne šege in običaji.

Upravljanje in raba objektov skozi čas

Skladišče Grando je imelo ves čas istega lastnika kot skladišče Monfort, zato so bile tudi upravljavska struktura in z njo povezane spremembe enake.

Odstopanja v rabi med skladiščema so nastala šele v zadnjih letih. Grando je bil od postavitve do leta 2014 namenjen izključno skladiščenju soli. V drugi kampati še vedno deluje družba Soline, d. o. o., ki ima v prostorih pakirnico soli. Preostale prostore lastnica (Občina Piran) oddaja različnim najemnikom, ki imajo v njih urejena skladišča.

Monfort je bil od postavitve do leta 1983 namenjen izključno skladiščenju soli. Sprva je bil v lasti Solinske uprave, nato pa Droge Portorož in kasneje Droge Kolinska. Leta 1983 je Droga Portorož eno od kampat skladišča odstopila turističnemu hotelskemu podjetju, kar označuje začetek uporabe skladišč v neindustrijske namene.

Preostale kampate so bile še vedno v uporabi Droge Portorož in namenjene prvotni rabi. Leta 1988 je bilo ustanovljeno podjetje Soline Pridelava soli, d. o. o., hčerinsko podjetje Droge Portorož, ki je prevzelo uporabo skladišča.

Leta 1994 je prišlo do lastninjenja družbene lastnine. Čeprav je bilo skladišče Monfort (skupaj s sosednjim Grandom) v uporabi Droge Kolinska oz. njenega hčerinskega podjetja, je bilo skladno s tedanjo zakonodajo izločeno iz lastninjenja, lastništvo pa je bilo preneseno na Občino Piran. Skladišči sta bili namreč takrat že zaščiteni z občinskim odlokem o spomenikih. S posebno pogodbo je občina Drogi Kolinska za obdobje 99 let podelila pravico do najema in uporabe obeh skladišč.

Leta 1997 je občinski svet Občine Piran sprejel Odlok o ureditvenem načrtu za obalno območje Bernardin – skladišče soli v Portorožu. Odlok je med drugim predvidel rekon-

strukcijo in spremembo namembnosti skladišča Monfort, rekonstrukcijo in delno spremembo namembnosti skladišča Grando ter razširitev in ureditev plaže s plažnimi pomoli v ožjem priobalnem pasu.

Leta 2002 se je z novelacijo pogodbe iz leta 1994 doba pravice Droge Kolinska do najema skladišč skrajšala na obdobje 25 let, z možnostjo podaljšanja. Leta 2002 je podjetje Soline, Pridelava soli, d. o. o., postalo last družbe Mobitel, d. d. Leta 2012 sta Občina Piran in Droga Kolinska sporazumno razvezali pogodbo o podelitvi pravice rabe. S tem sta obe skladišči prešli v uporabo občine.

Občina Piran je leta 2013 izvedla razpis za izbor idejnih rešitev urejanja območja skladišč soli. V pripravi je bil tudi natečaj, vendar ni bil izveden. Istega leta je bila promenada ob skladiščih zaprta za promet in spremenjena v območje za pešce.

Danes Občina Piran kot lastnik skrbi tudi za upravljanje objekta. Žal je upravljanje razpršeno med kabinet župana in več uradov občinske uprave in se izvaja parcialno. Za trženje skrbi kabinet župana, za izvajanje evropskih projektov Urad za gospodarstvo in turizem ter Samostojna investicijska služba, za programske vsebine pa Urad za družbene dejavnosti. Za investicijsko vzdrževanje in izboljšave objekta zagotavlja Občina Piran proračunska sredstva na postavki Sanacija skladišč soli v Portorožu.

Občina Piran vzhodno kampato (1) daje v uporabo Pomorskemu muzeju Sergeja Mašera v Piranu, ki tu hrani in predstavlja zbirko čolnov in bark. Zahodno kampato (4) imajo v uporabi Obalne galerije Piran. Osrednja prostora občasno oddajajo za različne prireditve. Kratek čas je v objektu deloval tudi muzej turizma. V zahodni kampati (5) je trgovina Mercator.

Uporabnost objekta za planirane aktivnosti in metodologija vrednotenja

Obstoječe stanje, ranljivost in ogroženost objektov

Objekt Grando je, čeprav slabo vzdrževan, v relativno dobrem stanju. Lesena strešna konstrukcija je na nekaterih mestih dotrajana, salonitna kritina je neprimerna. Največji problem so vlaga in neugodne vremenske razmere, povezane z agresivno morskno atmosfero. Problematičen je tudi kratek napušč pri obeh objektih, fasade so do višine dveh tretjin (do 6 m) močno izpostavljene deževju. Posebej na severni strani objektov se zaradi tega pojavljata mah in vegetacija. Fasado so v preteklosti poskušali reševati tudi z neustreznimi ometi in novejšimi beleži, vendar prav tako prihaja do odstopanja materiala od podlage.

Poleg vlage povzročča poškodbe na objektu tudi promet, ki poteka na severni strani območja, po glavni cestni povezavi med Piranom in Portorožem. Zaradi tresljajev in vibracij, ki jih povzročajo vozila, se širijo razpoke v tlaku in stenah. Notranji prostori objektov so le nujno vzdrževani.

Zaradi lokacije spomenika je v prihodnosti pričakovati še večje razvojne pritiske. Z opustitvijo dejavnosti skladiščenja soli in nepravilno izbiro novih dejavnosti obstaja možnost, da se spomeniku zmanjša kulturni pomen.

Objekt Monfort z okolico je v relativno dobrem stanju. Fasada je ponekod brez ometa. Na teh mestih je peščenjak že močno erodiran. Vidne so razpoke v objektu, kar bi bilo treba čim prej sanirati. Streha objekta Monfort je nova, krita s korci. Večinoma je zamenjano žlebovje, le na peti kampati, kjer je trgovina, ne.

Največji problem so vlaga in neugodne vremenske razmere, povezane z agresivno morskno atmosfero. Močno poškodovana južna fasada objekta Monfort je v območju delovanja kapilarne vlage površinsko sprana ali sprhnela, na teh mestih se kaže gradbeni sestav, ki je zaradi tega še bolj izpostavljen propadanju. Problematičen je tudi kratek napušč pri obeh objektih, fasade so do višine dveh tretjin (do 6 m) močno izpostavljene deževju. Posebej na severni strani objektov se zaradi tega pojavljata mah in vegetacija. Zaradi večjih dreves tik ob objektu se stene počasneje sušijo. Fasado objektov so v preteklosti poskušali reševati tudi z neustreznimi ometi in novejšimi beleži, vendar prav tako prihaja do odstopanja materiala od podlage.

Poleg vlage povzročča poškodbe na objektu tudi promet, ki poteka na severni strani območja, po glavni cestni povezavi med Piranom in Portorožem. Zaradi tresljajev in vibracij, ki jih povzročajo vozila, se širijo razpoke v tlaku in stenah. Zaradi lokacije spomenika je v prihodnosti pričakovati velike razvojne pritiske. Z opustitvijo dejavnosti skladiščenja soli in morebitno nepravilno izbiro novih dejavnosti obstaja možnost, da se spomeniku zmanjša kulturni pomen. Dopusne spremembe in možna raba objekta so opredeljene v *Izhodiščih za koncepte uporabe skladišč Monfort in Grando* (Plestenjak et al., 2018).

Kot primerna raba so ocenjeni:

- skladiščenje soli: vsaj v delu objekta naj se obdrži primarna raba objekta (Plestenjak et al., 2018, 47; poglavje 01-7.3.4.1);
- kulturne vsebine: dopusten je vnos muzejske oz. drugih kulturnih in javnih funkcij. Del vsakega objekta je treba nameniti interpretaciji objektov in njune prvotne namembnosti (Plestenjak et al., 2018, 47; poglavje 01-7.3.4.2);
- dejavnosti, povezane z morjem: dolgoročna raba naj bo povezana z morjem – kontinuiteta dostopa po morju – prevoz do solin, povezava z arheološkimi ostanki in potopljenimi predmeti (ladje, hidroplan) (Plestenjak et al., 2018, 47; poglavje 01-7.3.4.4).

Načrtovane vsebine

Leta 2013 je Občina Piran razpisala izbor variantnih rešitev za območje skladišč soli. Cilj izdelave je bil pridobiti najustreznejšo rešitev za vsebinsko – programsko, urbanistično, krajinsko in arhitekturno rešitev za obravnavano območje. Izbrana ideja naj bi bila aktualna še danes. Zmagovalec Boštjan Voda je uporabo prostorov v Grandu razdelil na večnamenski prireditveni prostor v zahodni kampati ter trgovsko-gostinski center v ostalih treh kampatah. V Monfortu pa je Voda predvidel nadaljevanje pretežno kulturnih vsebin: informacijsko turistično središče (četrti kampata), galerija in prostor za raziskave (tretja kampata), muzej turizma in zgodovine Pirana in Portoroža (druga kampata), mladinski kulturni center (prva kampata). Pred obema objektoma je predvidel novo območje za komunalne priveze.

Ne glede na to je Občina Piran k projektu REFREsh pristopila z idejo po ureditvi tretje kampate Monforta kot večnamenskega prostora za različne prireditve, ki bi ga lahko uporabljale različne veje kreativne industrije. V študiji Koncepti revitalizacije za skladišče Monfort, ki jo je izdelalo podjetje GEAArt, vizualne komunikacije, d. o. o. (Savinjska cesta 4, 3331 Nazarje), so preučene možnosti rabe prostora za:

1. protokolarne in prireditvene dejavnosti,
2. gastronomske dogodke,
3. in »prezentacijsko sobo« za dejavnosti zunanjih najemnikov.

Za definiranje rabe prostorov skladišča Grando in druge kampate skladišča Monfort je bilo v sklopu projekta REFREsh izvedenih tudi več posvetov z lokalnimi podpornimi skupinami z željo po identifikaciji potreb lokalne skupnosti po uporabi prostorov.

Lokalna skupnost vidi potrebo po:

- prostorih za druženje in ustvarjanje (mladinski kulturni center, medgeneracijski center, inkubator, *coworking*, prostor za mlade glasbene skupine, kreativne delavnice ipd.),
- športni dvorani (za večnamenske dogodke – košarko, odbojko na mivki, rolkanje, fitness ipd.),
- trgovinah z lokalnimi izdelki,
- kavarnah in bistrojih.

Na podlagi tega je bil pripravljen popis različnih dejavnosti, ki bi jih bilo mogoče izvajati v objektu, ter določena njihova primernost in obremenitev za spomenik.

Metodologija vrednotenja ustreznosti nove rabe

Glavni cilj projekta REFREsh je industrijski dediščini določiti novo rabo na način, da bo zadovoljila potrebe kreativne industrije ter hkrati ohranila dediščino in njene vrednote oz. jih še poudarila. Zato je bila pomemben del projekta tudi ocena uporabe objektov za bodočo novo rabo. Pri tem smo izhajali s stališča, da so vse funkcije, ki jih izkažejo poten-

cialni uporabniki, načeloma sprejemljive, vendar je treba oceniti, ali prostor dejansko ustreza zelenim funkcijam ter kako veliko obremenitev za objekt predstavlja določena nova raba. Iz primerjave bi nato lahko ugotavljali, katera raba bi bila najustreznejša.

Izsledke smo podali v obliki preglednice. Prvi del se navezuje na novo rabo objektov. Naštete so vse funkcije in dejavnosti, za katere je bil izkazan interes. Za vsako dejavnost smo preučili potrebe po velikosti in tipu prostora, po potrebni opremi in novih inštalacijah.

V drugem delu preglednice je podana ocena primernosti objekta za izvajanje dejavnosti s pomočjo štiristopenjske lestvice: 1 – objekt je primeren; 2 – objekt je primeren z omejitvami; 3 – objekt brez večjih sprememb ni primeren; 4 – objekt ni primeren. V obrazložitvi so navedene omejitve oz. pomanjkljivosti trenutnega stanja, določili pa smo tudi minimalne potrebne spremembe v objektu za izvajanje določene funkcije. Slednjič smo izbor primerjali z obremenitvami, ki jih posamezna funkcija in/ali sprememba predstavlja za spomenik. To smo vrednotili s pomočjo štiristopenjske lestvice: 1 – ni obremenitve; 2 – majhna obremenitev; 3 – velika obremenitev; 4 – največja obremenitev.

Na ta način smo tako lastniku (Občina Piran) kot predstavnikom lokalne skupnosti na zelo jasn način in brez vnaprejšnjega izključevanja prikazali najboljše možnosti uporabe objektov. Funkcije, ki za dediščino niso primerne in bi hkrati pomenile tudi največji poseg v dediščino, so se izkazale tudi kot cenovno najmanj ugodne. Za Monfort je bilo tako ugotovljeno, da sta tako tretja kot druga kampata dovolj veliki za vsako od naštetih aktivnosti. Ne glede na aktivnost, trenutno ni vse potrebne infrastrukture za sprejem večjega števila ljudi. V objektu ni toaletnih prostorov za večje število obiskovalcev. Te je treba zagotoviti znotraj objekta ali v njegovi neposredni bližini.

Družbene koristi novih vsebin v obeh objektih

Na podlagi ocene, predstavljene v preglednici, in skladno z željami lokalnega prebivalstva samo izbrali nekaj najustreznějšíh funkcij.

Večina prostorov objekta Monfort, ki imajo skupno 2280 m² uporabne površina, že ima programsko vsebino, ki jo v veliki meri izvajajo nosilci kulturne in kreativne industrije. Zato smo v analizi ustreznosti obravnavali le zgoraj naštete nove predloge za tretjo in drugo kampato. Vsi predlogi predvidevajo minimalne posege v spomenik in so reverzibilni. Nove funkcije (slika 9) bi poleg obstoječih (Mercator, razstavišče Obalnih galerij, razstavišče Pomorskega muzeja) obsegale večnamenski prostor za protokolarne in prireditvene dejavnosti ter gastronomijo v tretji kampati in interpretacijski center soli v drugi kampati.

| SKUPINA | FUNKCIJA* | DEJAVNOST/ AKTIVNOST | POTREBNI PROSTORI | POTREBNA OPREMA | INŠTALACIJE IN POTREBNE ZAHTEVE | POTREBNA POVRŠINA m ² | USTREZNOST OBJEKTA | | POTREBNE SPREMEMBE | OBREMNITEV ZA SPOMENIK |
|--------------------------------------|---------------------------------|---|---|--|--|-------------------------------------|--|---|---|---------------------------|
| | | | | | | | ocena | obrazložitev | | |
| K U L T U R N E | RAZSTAVIŠČE; GALERIJA, MUZEJ | razstave, seminarji, konference, srečanja, tečaji | predavalnice, delavnice, garderobe, prireditveno- razstavni prostor, ateljelij - delavnice | panoji, vitrine, osvetlitev, oprema za nadzor in varovanje | ogrevanje, elektro, internet, telefon | ni omejitve | 2 - objekt primeren z omejitvami | vlaga v prostoru ne omogoča predstavitve zbirk, temperatura v prostoru je spremenljiva, omejitev razstavnih/ razstavljenih predmetov | določiti maksimalno število obiskovalcev | 2 - MAJHNA |
| | KONCERTNA DVORANA | koncerti | večnamenski prireditveni prostor, zaoderdje, garderobe, skladišče, | stoli, projektorji, zasloni, projekcijsko platno, oder | ogrevanje, elektro, internet, telefon, voda, odtoki, klima, osvetlitev, ozvočenje | ni omejitve | 2 - objekt primeren z omejitvami | zaradi povečenih decibelov potrebno preveriti statično stabilnost objekta | določiti maksimalno število obiskovalcev | 3 - VELIKA |
| | VEČNAMENSKA DVORANA | uprizoritvene dejavnosti / gledališče, kino/ srečanja, tečaji, vadb, izobraževanje | večnamenski prireditveni prostor, zaoderdje, delavnice, garderobe, skladišče, servi | stoli, projektorji, zasloni, projekcijsko platno, oder | ogrevanje, elektro, internet, telefon, voda, odtoki, klima, osvetlitev, ozvočenje | ni omejitve | 1 - objekt je primeren | | določiti maksimalno število obiskovalcev | 3 - VELIKA |
| | ARHIV, DEPO | shranba dokumentov, rekvizitov | knjižnica, skladišče, delavnice | regalno skladišče | ogrevanje, elektro, internet, telefon, klima | ni omejitve | 3 - objekt je primeren z večjimi spremembami | vlaga, temperatura | prirrediti prostor kot "škaflo v škafli" - ustvariti novo uporabno mikroklimo | 4 - NAJVEČJA |

*za funkcije vseh prostorov je potrebno zagotoviti sanitarije, varovanje, požarno varnost

| SKUPINA | FUNKCIJA* | DEJAVNOST/ AKTIVNOST | POTREBNI PROSTORI | POTREBNA OPREMA | INŠTALACIJE IN POTREBNE ZAHTEVE | POTREBNA POVRŠINA m ² | USTREZNOST OBJEKTA | | POTREBNE SPREMEMBE | OBREMNITEV ZA SPOMENIK |
|---|--------------------------------------|--|---|--|---|-------------------------------------|--|-----------------------------|--|---------------------------|
| | | | | | | | ocena | obrazložitev | | |
| I Z O B R A Ž E V A L N E | KABINET, ATELJE, STUDIO | kreativne delavnice, coworking | delavnice, ... | stoli, mize, stalaže, računalniška oprema, strojna oprema | ogrevanje, elektro, internet, telefon, prezračevanje | min 3m ² / osebo | 1 - objekt je primeren | vlaga, temperatura | predelne stene, dnevna svetloba | 2 - MAJHNA |
| | MEDGENERACIJSKI CENTER | kreativne delavnice, tečaji, | predavalnice, delavnice, ... | stoli, mize, stalaže, računalniška oprema | ogrevanje, elektro, internet, telefon, prezračevanje | ni omejitve | 1 - objekt je primeren | vlaga, temperatura | zaželjena dnevna svetloba | 2 - MAJHNA |
| | PREDAVALNICA, MULTIMEDIJA | tečaji, kongresi, konference, izobraževanje, srečanja | prireditveni prostor, skladišče, servis | stoli, mize, projektorji, panoji, kateder | ogrevanje, elektro, internet, telefon, klima | 100 m ² / 100 ljudi | 1 - objekt je primeren | vlaga, temperatura | | 2 - MAJHNA |
| T U R I S T I Č N E | TURISTIČNA PISARNA - INFOTOČKA | posredovanje informacij, promocija, izobraževanje | pisarna, knjigarna, spominki | stoli, mize, panoji, vitrine, osvetlitev | ogrevanje, elektro, internet, telefon, osvetlitev | ni omejitve | 1 - objekt je primeren | vlaga, temperatura | predelne stene | 2 - MAJHNA |
| | VINSKA KLET - VINOTEKA | degustacija, catering, hramba | prostor za goste | stoli, mize, točilni pult, hladilniki | elektro, internet, telefon, ogrevanje, voda, odtoki | 1 m ² / osebo | 2 - objekt primeren z omejitvami | vlaga, temperatura, vonj | pijačo se hladi s prinešenimi hladilniki, v primeru kleti je potrebno ustvariti posebno mikroklimo "škaflo v škafli" | 2 - MAJHNA |
| G O S T I N S K E | KAVARNA, ČAJNICA | kafetanje | prostor za goste | stoli, mize, točilni pult | elektro, internet, telefon, ogrevanje, voda, odtoki | 1,5 m ² / osebo | 1 - objekt je primeren | vlaga, temperatura, vonj | | 2 - MAJHNA |

| SKUPINA | FUNKCIJA* | DEJAVNOST/ AKTIVNOST | POTREBNI PROSTORI | POTREBNA OPREMA | INŠTALACIJE IN POTREBNE ZAHTEVE | POTREBNA POVRŠINA m ² | USTREZNOST OBJEKTA ocena | obrazložitev | POTREBNE SPREMEMBE | OBREMENITEV ZA SPOMENIK |
|-------------------|---------------------------------|--|---|--|--|-------------------------------------|--|-----------------------------|---|----------------------------|
| G O S T I N S K E | RESTAVRACIJA, GOSTILNA | degustacija, catering | prostor za goste, točilnica, kuhinja, sanitarije | stoli, mize, pult | elektro, telefon, ogrevanje, voda, odtoki, prezračevanje | 1,8 m / osebo | 2 - objekt primeren z omejitvami | vlaga, temperatura, vonj | ustvariti ustrežno klimo za degustacijo , v poštev prid le sveža potrežba | 3 - VELIKA |
| | RESTAVRACIJSKA KUHNJA | druženje, priprava hrane, | prostor za goste, pomivalnica, hladilnica, skladišča, garderoba, prevzem blaga | stoli, mize, pult, oprema za pripravo in serviranje hrane, omare | ogrevanje, elektro, telefon, voda, odtoki, klima, prezračevanje | 6 m ² / na osebo | 4 - objekt ni primeren | vlaga, temperatura, vonj | pridrediti prostor kot "škaflo v škafli" - ustvariti novo uporabno mikroklimo, potrebno urediti primerne prezračevanje | 4 - NAJVEČJA |
| | POSLOVNI PROSTOR, PISARNE | podjetniški inkubator, oglaševanje, prodaja, delavnica, pisarniška dejavnost | pisarne, čajna kuhinja | mize, stoli, police, omare, predelne stene | elektro, voda, telefon, internet, prezračevanje, ogrevanje, klima, potreba po dnevni svetlobi | 3 m ² / osebo | 3 - objekt je primeren z večjimi spremembami | vlaga, temperatura | namestiti več odprtih, pridrediti prostor kot "škaflo v škafli" - ustvariti novo uporabno mikroklimo, potrebno urediti primerne prezračevanje | 4 - NAJVEČJA |
| P O S L O V N E | TRGOVSKI LOKAL, TRGOVINA | prodaja | prodajalna, skladišče | stalaže, pulti, mize, stoli | elektro, voda, internet, telefon, ogrevanje | ni omejitve | 3 - objekt je primeren z večjimi spremembami | vlaga, temperatura | pridrediti prostor kot "škaflo v škafli" - ustvariti novo uporabno mikroklimo, potrebno urediti primerne prezračevanje | 4 - NAJVEČJA |
| | TRŽNICA | prodaja, sejmarjenje, degustacija | | pulti, mize | elektro, voda, odtoki, prezračevanje | ni omejitve | 2 - objekt primeren z omejitvami | vlaga, temperatura, vonj | ustvariti novo uporabno mikroklimo, potrebno urediti primerne prezračevanje | 2 - MAJHNA |

| SKUPINA | FUNKCIJA* | DEJAVNOST/ AKTIVNOST | POTREBNI PROSTORI | POTREBNA OPREMA | INŠTALACIJE IN POTREBNE ZAHTEVE | POTREBNA POVRŠINA m ² | USTREZNOST OBJEKTA ocena | obrazložitev | POTREBNE SPREMEMBE | OBREMENITEV ZA SPOMENIK |
|---------------------|--------------------------------|--|--|--|--|-------------------------------------|--|--------------|---|----------------------------|
| Š P O R T N E | FITNESS | vadba, rekreacija | fitness studio, sprejemnica, tuši, garderoba | pult, miza, naprave za športno vadbo | elektro, ogrevanje, voda, odtoki, prezračevanje, klima | 50 - 200 m ² | 3 - objekt je primeren z večjimi spremembami | | pridrediti prostor kot "škaflo v škafli" - ustvariti novo uporabno mikroklimo, potrebno urediti primerne prezračevanje | 4 - NAJVEČJA |
| | ŠPORTNA DVORANA | vadba: hokej (20 x 40 m), mali nogomet in rokomet (20 x 40 m), gimnastika, košarka (26 x 14 m), odbojka (18 x 9 m), tenis (36,5 x 18,3 m), badminton (13 x 6 m), balinišče (24 x 3 m) | igrišča, garderoba, tuši | odvisno od namembnosti | elektro, ogrevanje, voda, odtoki, prezračevanje, klima | glej dejavnost | 1 - objekt je primeren | | prezračevanje | 2 - MAJHNA |
| | SAVNA, SPA, whirpool | užitek (-) | garderoba, kopeli, tuši, | peč, kotel za vodo, bazenčki, savne, ležalniki, sedeži, solarij | elektro, ogrevanje, voda, odtoki, prezračevanje, klima | ni omejitve | 3 - objekt je primeren z večjimi spremembami | | pridrediti prostor kot "škaflo v škafli" - ustvariti novo uporabno mikroklimo, potrebno urediti primerne prezračevanje | 4 - NAJVEČJA |
| KLUBSKI PROSTORI | druženje, hramba rekvizitov | | pisarne, klubska soba, shramba, delavnica | odvisno od namembnosti | elektro, voda, internet, telefon, ogrevanje, voda, odtoki | ni omejitve | 1 - objekt je primeren | | | 2 - MAJHNA |

| | | | | | | | | | | |
|--------------------------------|----------------|-------------------------------|--------------------------------|--|--|--|--|--|---|--------------|
| S O B A S K O P A L N I C O | prenočitev | bivalni atelje, sanitarije | postelja, omara, miza, stol | elektro, voda, odtoki, internet, telefon | 18 m ² / 2 osebi | 3 - objekt je primeren z večjimi spremembami | | | pridrediti prostor kot "škaflo v škafli" - ustvariti novo uporabno mikroklimo, potrebno urediti primerne prezračevanje | 4 - NAJVEČJA |
| | SKUPNA LEŽIŠČA | prenočitev | bivalni atelje, sanitarije | postelja, omara, miza, stol | elektro, voda, odtoki, internet, telefon | 8 m ² / osebo | 3 - objekt je primeren z večjimi spremembami | | pridrediti prostor kot "škaflo v škafli" - ustvariti novo uporabno mikroklimo, potrebno urediti primerne prezračevanje | 4 - NAJVEČJA |

V spodnji preglednici navajamo družbenoekonomske koristi, ki bi jih pridobil objekt Monfort z novo funkcijo:

| NEPOSREDNE KORISTI | POSREDNE KORISTI |
|---|--|
| - vzpostavitev novega kulturnega središča na obali | - izhodišče za spoznavanje širše okolice |
| - prihodek lahko omogoči kritje stroškov rednega vzdrževanja, ki so zdaj breme lastnika – potrebno kakovostno trženje | - sekundarni prihodek za lokalno prebivalstvo (bifeji, restavracije, trgovine, prenočišča),... |
| - zaposlovanje v sklopu novih funkcij objekta | - zaposlovanje v sekundarnih sektorjih (storitvene dejavnosti) |
| - dolgoročno je možnost zaposlitve osebe za marketing | |
| - razvoj KKI v Občini Piran | |
| - povečanje obiska (turizma) zaradi kulturnih dejavnosti | - prerazporeditev turistov od obstoječih atrakcij, na do sedaj manj zanimive predele |
| | - sprememba toka turistov – dogajanje preko celega leta |
| | - urejanje okolice |
| | - vzpostavi se promenada med Portorožem in Bernardinom |

Preglednica 2: Neposredne in posredne koristi objekta Monfort z novo funkcijo

Nove vsebine v Monfortu bi torej nadgradile obstoječi program: ob obstoječih razstaviščih Obalnih galerij in Pomorskega muzeja bi bila tretja kampata še naprej posvečena protokolarnim in prireditvenim dejavnostim, druga kampata pa interpretacijskemu centru solinarstva, ki tudi dopušča možnost občasnih rab in povezav s kreativnimi dejavnostmi. Trenutna raba tretje kampate se, predvsem od poletja 2019, vse bolj odpira konkretnim predstavitev sodobnih kreativnih praks, od glasbe do vizualnih in digitalne umetnosti.

V spodnji tabeli navajamo družbeno-ekonomske koristi, ki bi jih pridobil objekt Grando z novo funkcijo:

| NEPOSREDNE KORISTI | POSREDNE KORISTI |
|---|--|
| - vzpostavitev nove točke druženja za lokalno prebivalstvo (medgeneracijski center) | - zadovoljstvo lokalnega prebivalstva |
| - prostori za kreativno podjetništvo | - promocija lokalnih produktov |
| - nov športno-rekreacijski center | |
| - prihodek omogoča kritje stroškov vzdrževanja | - sekundarni prihodek za lokalno prebivalstvo (bifeji, restavracije, trgovine, prenočišča),... |
| - nova delovna mesta | - zaposlovanje v sekundarnih sektorjih (storitvene dejavnosti) |

Preglednica 3: Neposredne in posredne koristi objekta Grando z novo funkcijo

V Grandu je v štirih kampatah na voljo 4525 m² površin. Podrobneje smo preučili naslednje programske rešitve (slika 10):

1. športna dvorana – prva kampata,
2. fitnes center s predelom za masaže in savne ter garderobe – druga kampata,
3. medgeneracijski in Coworking center – tretja kampata,
4. trgovsko-gostinski predel – četrta kampata.

Izbor je bil narejen primarno glede na želje lokalne skupnosti. Upoštevali pa smo tudi ustreznost objekta in obremenitve za spomenik. Hkrati se zavedamo tudi pomena trajnostne rabe in vzdrževanja objekta, zato so bile izbrane funkcije, ki so namenjene tako kulturnokreativnim dejavnostim kot tudi tržno naravnanim funkcijam. Objekt bi obsegal športne aktivnosti za rekreacijo, prostor za spremljevalne dejavnosti pri športu; druga kampata bi bila namenjena kreativnim delavnicam in medgeneracijskemu centru, prva kampata, nasproti Monforta, pa prodajalni lokalnih proizvodov in restavraciji s ponudbo lokalnih prav teh proizvodov.

Sklep

Industrijska dediščina portoroških skladišč soli Monfort in Grando ima velik družbeni pomen: gre za edini dve historični skladišči soli, ki še obstajata v Občini Piran, predvsem pa sta obe do nedavnega še imeli izvorno funkcijo. Sprememba izvorne namembnosti pa je ponudila možnosti, da se v prostranih notranjih prostorih razvije raznovrstna dejavnost. Zahodni objekt, Monfort, že nekaj let gosti kulturne vsebine, v okviru Interreg projekta REFRESH pa smo razvijali izhodišča za umestitev dodatnih vsebin s področja kulturne in kreativne industrije. Ker Monfort skupaj s sosednjim skladiščem Grando tvori prostorsko enoto, predvsem pa sta skladišči zgodovinsko povezani, smo v analizo možnih novih rab vključili oba objekta. Predlagane nove rabe smo primerjali z njunimi potrebami ter z omejitvami, ki jih objekta nosita, slednjič pa smo jih primerjali še z vidika obremenitve za spomenik.

Z analizo smo zajeli vse možne funkcije, tudi take, ki bi jih konservator že na prvi pogled takoj zavrgel. Vendar pa smo se odločili, da ne bomo izključujoči *a priori*, temveč bomo sodelovali z zainteresiranimi javnostmi. Analiza je jasno pokazala, da bi funkcije, ki za spomenik niso primerne, hkrati pomenile tudi največji poseg vanj, izkazale pa so se tudi kot cenovno najmanj ugodne. Na ta način smo vzpostavili konstruktiven dialog z zainteresirano javnostjo, ki je predstavljene izsledke z zadovoljstvom sprejela.

Čeprav gre le za študijo, ki se v prakso še ne bo prenesla, je nastal dokument, ki lastnika (Občino Piran) usmerja k razmisleku o prihodnji rabi, ki bo za spomenik najmanj obremenjujoča.

Povzetek

Prispevek obravnava možnosti vključevanja kulturne in kreativne industrije v oživljanje opuščenih skladišč soli Monfort in Grando v Fizinah, med Portorožem in Bernardinom. Stavbi sta zgrajeni na utrjeni ploščadi, postavljeni na morsko dno, ki se proti morju zaključuje s kamnitimi

pomoli. Gre za masivna objekta z dolgimi pravokotnimi tlorisi, zgrajena med letoma 1824 in 1838. Razlog za izgradnjo je bila povečana proizvodnja soli in posledično potreba po njenem skladiščenju v centralnih državnih skladiščih. Vse od postavitve do nedavnega sta objekta služila prvotnemu namenu – skladiščenju soli. V Monfortu je bilo skladiščenje povsem končano leta 2012. V eni kampati je danes trgovina Mercator, drugo imajo v uporabi Obalne galerije Piran, osrednji dve lastnik (Občina Piran) občasno oddaja v najem za kulturne prireditve, vzhodno pa ima v uporabi Pomorski muzej Sergeja Mašera v Piranu, ki tu hrani in predstavlja zbirko čolnov in bark. Sosednji objekt, Grando, še vedno služi kot skladišče. Prostori se oddajajo različnim uporabnikom. Le osrednja kampata, katere najemnik je SOL, Soline, d. o. o., še vedno služi prvotnemu namenu. V njej se skladišči in pakira sol. V ostalih prostorih se hrani drugo blago. Masivna objekta z velikimi, pokritimi in med seboj povezanimi prostori nudita številne možnosti boljše uporabe za sedanjo družbo, kar je bilo izpostavljeno v strateških dokumentih občine v okviru turističnih potencialov. Občina Piran želi v revitalizacijo vključiti kreativno industrijo, zato je bila v okviru projekta REFRESH preverjena možnost preoblikovanja tretje kampate skladišča Monfort v kulturno-zabavno središče. Na celotni slovenski obali je namreč izrazito pomanjkanje prostorov za večje javne prireditve. V prispevku predstavljamo razvoj objektov ter analizo različnih možnosti uporabe obeh skladišč. Za vsako od možnih novih funkcij je določena potreba po prostoru ter analizirana ustreznost objekta za tovrstno rabo ter glavne pomanjkljivosti. Naštete so še glavne spremembe, ki so potrebne na objektu v primeru nove rabe. Ker gre za konceptualno študijo izvedljivosti, je obravnavana zlasti tehnična izvedljivost. Na koncu podjamo še družbenoekonomsko analizo koristi.

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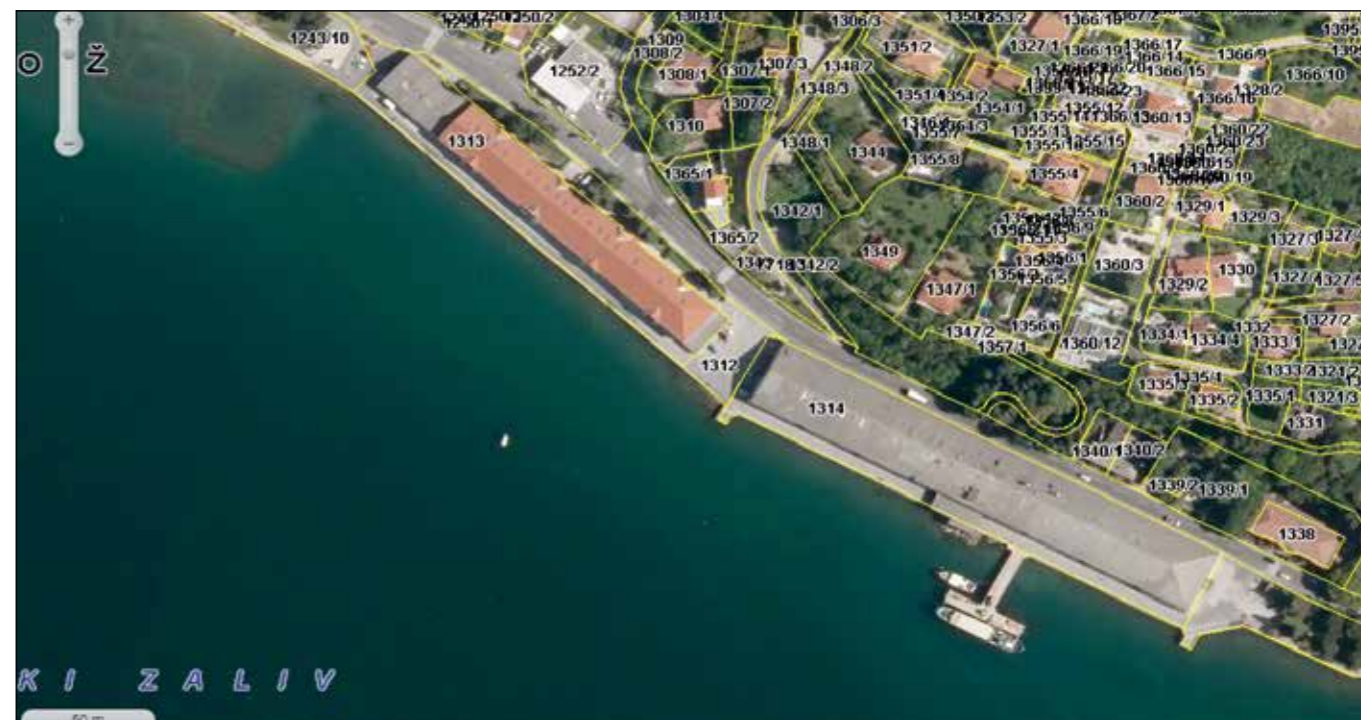
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1. Lokacija skladišča Grando in Monfort na katastru (vir: e-prostor.gov.si, dostop 19. 6. 2018)

1. Location of the Grando warehouse in the cadastre. Source: e-prostor.gov.si, accessed 19 June 2018



2. Pogled na objekt Grando (foto: Ana Plestenjak)

2. View of the Grando warehouse. Photo: Ana Plestenjak



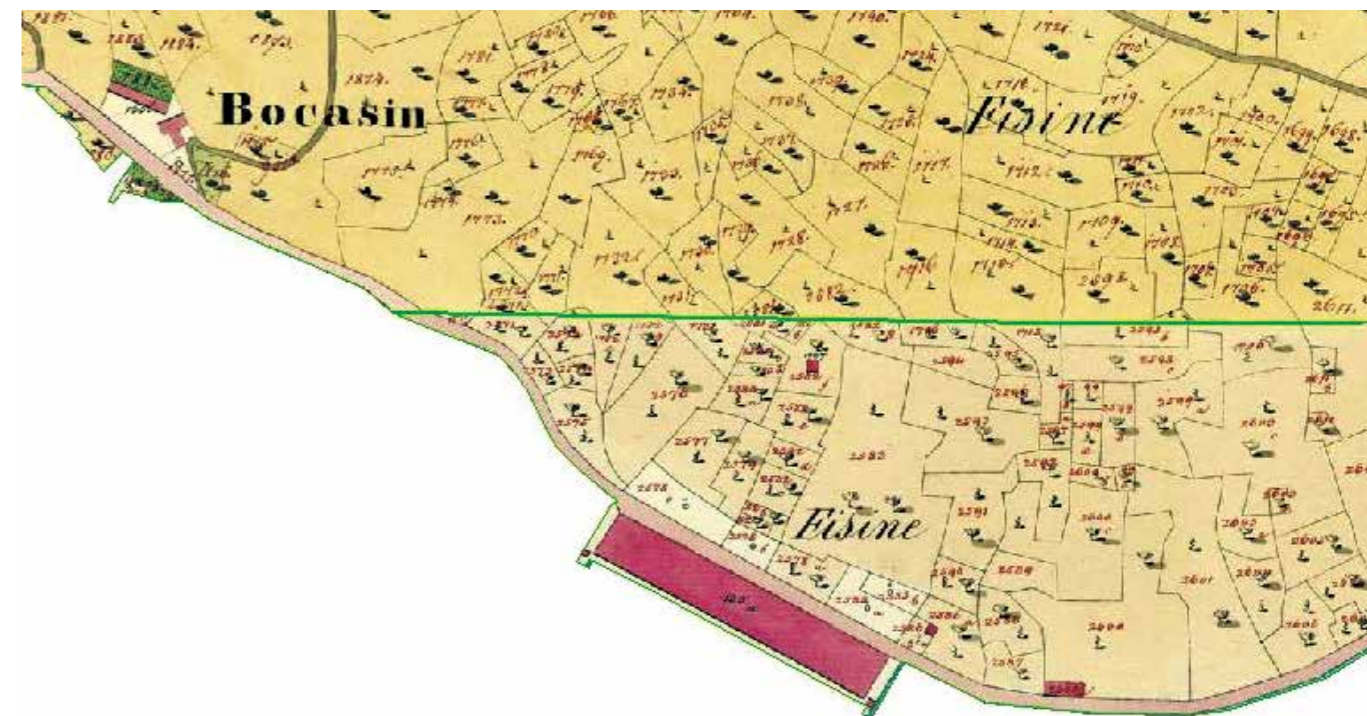
3. Pogled na objekt Monfort (foto: Ana Plestenjak)
3. View of the Monfort warehouse from the sea. Photo: Ana Plestenjak



5. Notranjost 2. kampaite skladišča Monfort, brez stenskih oblog (foto: Ana Plestenjak)
5. Interior of bay 2 of the Monfort warehouse, without wall cladding. Photo: Ana Plestenjak



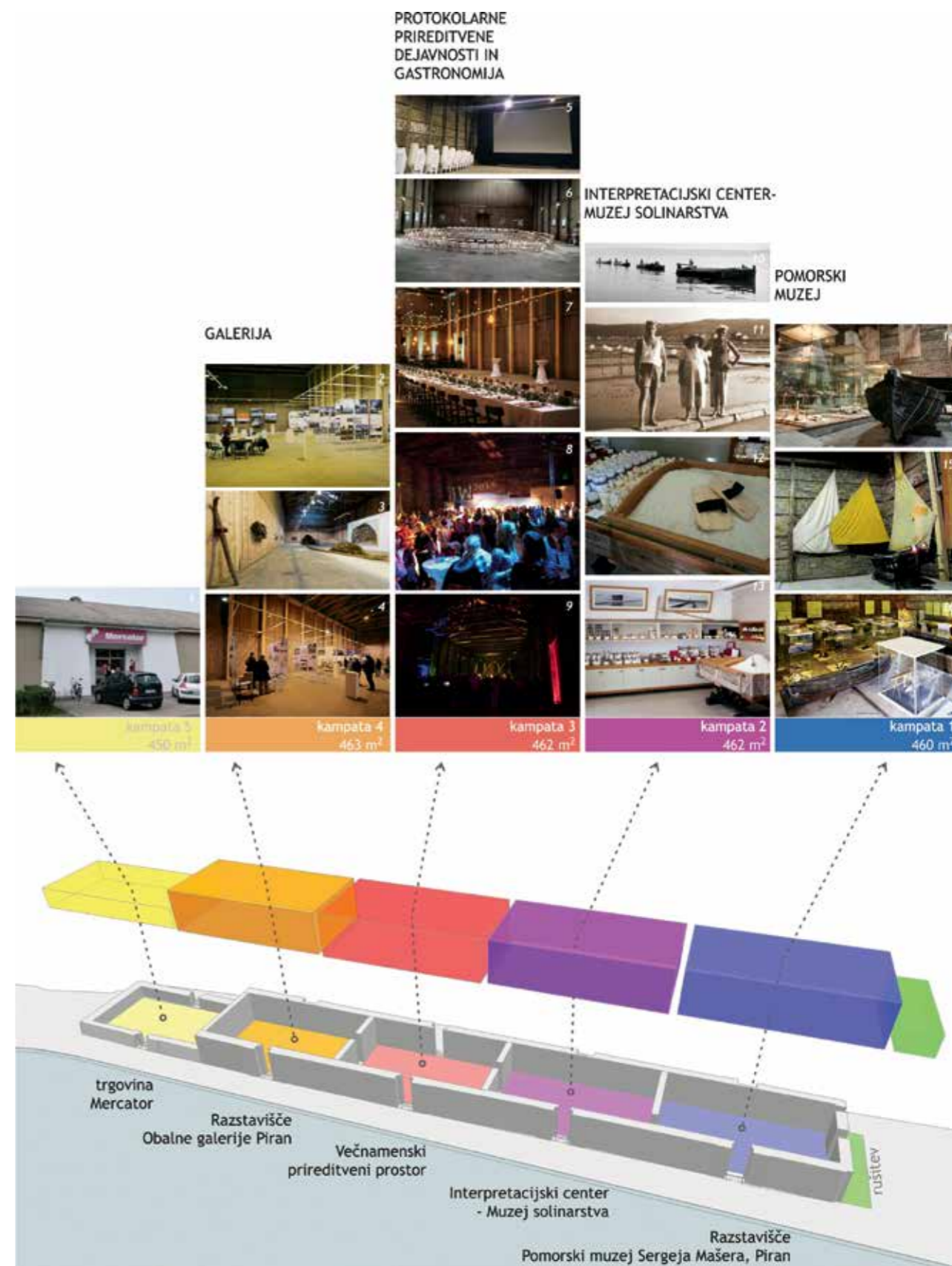
4. Notranjost 3. kampaite skladišča Monfort z lesenimi oblogami sten (foto: Ana Plestenjak)
4. Interior of bay 3 of the Monfort warehouse with wooden wall cladding. Photo: Ana Plestenjak



6. Izsek iz Franciscejskega katastra iz leta 1825, kjer je vidno je le skladišče Grando, vir: Franciscejski kataster / Catasto Franceschino (Državni arhiv v Trstu / Archivio statale di Trieste).
6. Extract from the Franciscan cadastral survey of 1825, in which only the Grando warehouse is visible. Source: Catasto Franceschino (Archivio di Stato di Trieste)



7. Zaris lokacije skladišč soli iz Registra kulturne dediščine Slovenije, vir: <http://giskd6s.situla.org/giskd/>, 25. 9. 2018
 7. Drawing of the location of the salt warehouses from the Register of Cultural Heritage of Slovenia. Source: <http://giskd6s.situla.org/giskd/>, accessed 25 September 2018



8. Pregled novih funkcij prostorov v Monfortu, avtorica Aleksandra (Saša) Vesenjajk
 8. Diagram showing the new functions of the spaces in the Monfort warehouse, by Aleksandra (Saša) Vesenjajk



9. Pregled novih funkcij prostorov v Grandu, avtorica Aleksandra (Saša) Vesenjok
 9. Diagram showing the new functions of the spaces in the Grando warehouse, by Aleksandra (Saša) Vesenjok

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Starting points for the renovation of the Monfort and Grando salt warehouses in Portorož

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Abstract

The paper considers the Monfort and Grando salt warehouses, two monuments of local importance in Portorož which have been the subject of consideration within the transboundary project REFREsh in the period 2017–2020. We present the development of the two buildings, their characteristics and condition, and aspects relating to their management. We also offer a separate presentation of the method of assessing the suitability of proposed new uses with regard to the individual limitations presented by each individual structure. On this basis, we present a selection of suitable new functions that combine both the desire for development of the cultural and creative industries in the municipality and the needs of the local population.

Introduction

The article considers possibilities for the inclusion of the cultural and creative industries in the revitalisation of the abandoned Monfort and Grando salt warehouses in Fizi-
 ne, Portorož that were the object of studies as part of the REFREsh project (2017–2020, Interreg Central Europe). The central topic of the article is the methodology used to assess the suitability of new contents with regard to the characteristics and condition of the buildings.

The two warehouses are massive buildings with long, rectangular floor plans constructed in the early nineteenth century. The reason for their construction was increased salt production and the consequent need to store salt in central state warehouses. The two buildings served their original purpose – that of storing salt – from the time of their construction until quite recently. Salt storage in the Monfort warehouse came to a complete end in 2012. Today the building's function is far from its original purpose. One bay houses a Mercator supermarket, another is used by the Obalne Galerije Piran/Gallerie Costiere Pirano art galleries, the central two are occasionally hired out for cultural events by their owner, the Municipality of Piran, while the easternmost bay is used by the Sergej Mašera Maritime Museum (Piran) to store and present its collection of boats and other vessels. The neighbouring building, known as Grando, still serves as a warehouse, with space leased to various users. Only the central bay, which is leased to Soline d.o.o., still serves its original function in that it is used for the warehousing and packaging of salt.

The two massive buildings, which lie next to the coastal promenade connecting two important tourist resorts – Portorož and Piran – occupy an eminent position on Slovenia's short coast. Consisting of large, covered and interconnected spaces, they offer numerous opportunities for better use by today's society. The *Municipality of Piran Tourism Development*

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Strategy 2009–2015 (Municipality of Piran 2009) states that while the municipality has a large number of accommodation capacities, including some of high quality, “they are unable to offer visitors a full and rich experience of the destination because of the lack of a diverse and attractive offering of various products and programmes within the destination itself”. It also emphasises that “the opportunities offered by the destination with its natural and cultural characteristics are not exploited” (Municipality of Piran 2009, 6).

In this context the two warehouses permit the development of numerous sectors that could offer interesting experiences and enhance the tourism offering with cultural and heritage content. For this reason, the Municipality of Piran wishes to give the spaces a new function that will be sustainably oriented and at the same time profitable. It would like to include the creative industries in the revitalisation, since it recognises added value in them. Accordingly, the REFRESH project included verification of the possibility of transforming the third bay of the Monfort warehouse into a cultural/entertainment centre to be used for major events. This was subsequently implemented in the course of the project. There is, in fact, a distinct lack of spaces/venues for major public events along the Slovenian coast. Furthermore, it became apparent at workshops with local stakeholders held in the course of the project that the local community, local associations and non-governmental organisations also need spaces for their activities, and these could also be provided by the warehouses. The REFRESH project therefore also included the preparation of a study of possibilities for new contents focused on the local community for the neighbouring Grando warehouse.

In this paper we present various possibilities of use for the two warehouses, all of which we have examined with the help of a specially adapted method of evaluation. After presenting the characteristics, development, use and management of the two buildings, we analyse several of the desired new functions.

Principal Characteristics of the buildings

Description of the buildings

The buildings stand on a quay constructed on the seabed which ends with stone jetties on the seaward side and extends into the steeply rising terrain on the north (landward) side. A residential area consisting of individual houses begins at the point where the terrain starts to rise. In the Bernardin direction, the area borders a beach, which continues as far as a hotel complex. In the other direction, the built shoreline continues towards Portorož, with no specific

function except that it forms part of the coastal promenade that is interrupted in the area of the two salt warehouses. The older and larger of the two salt warehouses, built between 1824 and 1828, was originally called Fisine, although later it became known as Grando, because of its size. To the west of it stands the smaller and slightly more recent Monfort warehouse. The thick walls of both buildings are constructed of cut sandstone blocks and slope inwards in order to withstand the pressure of the salt from the interior. They stand on wooden piles driven into the seabed.

The Grando warehouse is a very simply designed building in the shape of an elongated rectangle (Figs 1 and 2). The building’s main vertical system consists of massive walls built of sandstone blocks that get narrower as they rise. The walls are 250 cm thick at the bottom and approximately 195 cm thick at the top. The building measures 186 x 29 m and is divided into four bays. The bays at either end are longer (east end 83.4 m, west end 44.45 m), while the two central bays are shorter (22.8 x 22.9 m). Inside the building are supporting walls reinforced by pilasters that project more than a metre into the space. The interior supporting walls are of different thicknesses (the one at the west end is 2.8 m thick while the other two are 1.81 m thick). The warehouse has a salonite (asbestos cement) pitched (gable) roof that ends in a hip on the SE elevation. The walls are approximately 8 m high and the total height of the building is 11 m.

The area around the building is asphalted and the building stands between the road and the quay/jetty. A pavement runs along the road on the north (road) side of the building. The section of shoreline in front of the Grando warehouse ends in two small jetties at either side of the building and a large pontoon pier in front of the entrance to the second bay. The latter was constructed in 1983 and used by large vessels for the loading and unloading of salt. To facilitate this operation, a conveyor belt system, along with all the pertaining elements, was installed on the frontage of the building. This allowed salt to be unloaded from ship to warehouse. A conveyor belt system was also installed in the roof space inside the building and ran the entire length of the warehouse.

The Monfort warehouse (Figs 3 and 4) is likewise a massive rectangular structure measuring 20.11 x 156.52 m. It was built between 1838 and 1858. The exterior of the building is distinguished by an architectural design in the classical style. The south and north fronts each have five slightly protruding sections, spaced at regular intervals, each consisting of a vertical rectangular niche topped by a triangular pediment. On the seaward side the niches contain doors, while on the landward (north) side of the building the niches are blind. The central niche on the seaward (south) side has a raised parapet bearing the inscription Monfort above the cornice instead of a triangular pediment. A stone cornice along the top of the walls connects all four sides of the building.

The building was originally divided into five equally sized spaces or bays by means of strong walls. Each bay was en-

tered via a pair of double wooden doors placed one on top of the other. These served both for loading salt and to provide constant ventilation, which is a requirement when storing salt. The westernmost bay was destroyed during the Second World War and subsequently only rebuilt to half the height of the building. Today this bay houses a Mercator supermarket. A small extension has been built up against the east end of the building.

The warehouse roof is of the pitched (gable) type and ends with a hip on the SE elevation. The roof structure is still essentially the original one. Roof openings with semicircular windows are inserted above the doorways (both functional and blind). In 2014 the corrugated salonite cement roofing was replaced by a new brick roof covering. Skylights were inserted along the north side of the roof. In the past the interior walls were covered with wood cladding up to the height of the cornice (Fig.5). The cladding was fixed with nails to wooden beams running along the walls and spaced at vertical intervals of approximately 100 cm. The cladding has been removed from most of the spaces in the warehouse and only conserved (or restored) in the third and fourth bays. The removal of the cladding in the second bay has left visible stonework (Fig.6). The partition walls between the bays are pierced by simple double wooden doors. The warehouse spaces (bays 1–4) have a smoothed concrete /asphalt/ floor of a thickness that corresponds to a height of 25 cm on the wooden piers or posts supporting the roof structure. This means that both the piers supporting the roof structure and the wooden structure on which the piers themselves stand are set in concrete. The floor surface is not level.

The roof structure of the westernmost (fifth) bay (housing the supermarket) is more recent (post-WW2). It is built according to a similar principle, although the execution is different. The bay is spanned by 12 timber roof trusses. The wooden structure consists of a central post (20 x 20 cm) supporting a ridge purlin (20 x 20 cm), while the rafters are supported by an inferior purlin (25 x 25 cm), an intermediate strut and the ridge purlin (20 x 20 cm), while triangular spacers (20 x 20 cm) help relieve the load on the rafters. Wooden planking and a roof covering consisting of corrugated salonite panels are placed across the rafters. The bay is divided by means of a wooden partition wall into the main shop and several small storage spaces, offices with toilet facilities, etc. The floors are covered with ceramic tiles except in the offices, which have parquet floors. The walls are plastered, painted or tiled. The ceiling is wooden and the shop additionally has a prefabricated suspended ceiling. The extension at the east end of the building has a lean-to (mono-pitched) roof. The floors are terrazzo in the corridor and kitchenette, parquet in the offices and ceramic tile in the cloakrooms and toilet facilities. The walls are plastered, painted or tiled. The window frames and shutters are wooden.

The area around the building is asphalted. A pavement runs along the north side of the building (the road side). Beyond

that is a strip of greenery planted with low decorative shrubs and tall trees (cypresses) and then the pavement running along the road itself. There are parking spaces at the east and west ends of the building and the stone quay on the south (seaward) side is covered with asphalt.

Historical development of the buildings

The production of salt on the northern coast of Istria began to increase in intensity during the Napoleonic period of the Illyrian Provinces. Among other things, this led to the growth of the Sečovlje saltworks, which reached their present size soon after 1814. The increased production created a need for new central warehouses. The plans for these were for the most part prepared by the French, although the warehouses were actually built by the Austrians.

The first large warehouse for Piran salt was the Antenale warehouse in Fasana (built 1822, demolished 1962). In 1824 the “*Presidenza della Consorzio delle Saline di Pirano*” announced a competition for the construction of a second new warehouse, to be built in Fisine (Fizine). Seven designs were submitted, with the design of the architect Nicolò Signorini selected as the winning entry. The new warehouse, referred to as *Magazen grando* or *Magazen novo* (Fig. 7), was built to this design in Fisine (Fizine) that same year. The work was carried out by the builder Francesco Bracciadoro, who subcontracted masons from Senj and Bakar in Croatia. Within four months a warehouse measuring 132.72 x 22.75 m had been built. Although the original design envisaged four doors on the seaward side of the building and a door at either end, Bracciadoro instead built five doors on the seaward side and no doors at the ends of the building (Bonin, 2018: 16). It was therefore necessary to add doors at either end of the building, above which round windows were also added. Two partition walls were also built (ibid.). The two smaller sections of the warehouse could each hold 12,600 hundredweight (630 tons) of salt, while the larger section could store 225,500 hundredweight (11,275 tons) of salt. Since this capacity was too small, in 1826 the “*Inclita Imperia Regia Direzione delle Saline*” approved the construction of an extension capable of holding an additional 6,000 *modii* of salt (approximately 5,208 tons) (ibid., 20). The plan was examined by the engineer E. Vorbeck, who decided, for the sake of symmetry, that the building should be extended by 23 klafters and 2 feet (44.09 m), which would give the extension a capacity of 7,900 *modii* of salt. This extension was intended for better quality salt and would therefore be fitted with wooden cladding. The extension, which was added to the west end of the building, was also built by Bracciadoro. The masons did their work poorly, since Bracciadoro did not supervise them (Benčič et al., 2014). When they

had almost reached roof height, the north wall collapsed and the south wall split open. Several workers were injured (ibid., 22). Inspectors came from Trieste and Graz and found that construction had been carried out very negligently, that the builders had used uncleaned stone and that they had mixed the mortar with salt water, with the result that it had not dried. Not only that, but they had placed the walls outside the foundations. They had also cheated when it came to building the quay. This was supposed to be built entirely of limestone, but instead they had used sandstone for the inner part (ibid., 23). The workers were made to pull down all the walls and start again. Bracciadoro paid a fine and the inspectors sent an instruction specifying that only fresh water should be used in construction. The warehouse was completed in November 1828 (ibid., 26). The building remained practically untouched until 1968 (or 1983).

The Monfort warehouse is believed to have been constructed in 1838 in response to the state's great need for additional storage space for salt. At the time of its construction, the Grando warehouse already stood to the east of it, but this did not provide enough space for all the salt. The works were carried out by the Innocenzo Turrini company of Trieste (Benčić et al., 2014). The original plans have not survived, but a plan of repairs from 1858 (Fig. 9) is kept at the National Archives in Trieste. The south-west wall of the building and part of the shore had begun to subside, so repairs had to be carried out between 1858 and 1859, as can be seen from the plan. It was probably during the course of these repairs that the panel with the inscription Monfort was placed above the door of the central bay. The reason for this name is not entirely clear. It is possible that the warehouse was named after Maurizio Manfroni di Monfort, who was posted to the financial administration in Trieste in 1832 and later advanced in the imperial service. Flavio Bonin¹ assumes that he was responsible for repairing the warehouse and that it was named after him in recognition of this. Subsequent to the construction of the Monfort warehouse, a further small building was built next to it. This building, known as the *casel*, served as the office for the coastal superintendent. Its exact location is not entirely clear, since it was either demolished or incorporated into the newer extension on the east front of the Monfort warehouse.

The Monfort warehouse underwent a number of changes during and after the Second World War. During the war, the westernmost bay of the building was destroyed during a July 1944 bombing raid on the seaplane hangar that stood to the west of the warehouse (Knez, 2014: 19). This bay was later rebuilt but only up to half the height of the rest of the building (Fig. 8). A further extension was built at the east end of the building after the war and connected to the easternmost bay of the warehouse. This extension housed the offices of the saltworks management. Within the eastern-

most bay, the eastern section of the Monfort warehouse was converted. Cloakrooms and toilet facilities for employees were created on the ground floor, while the first floor was used to house the archives. In addition to a masonry mezzanine, a plasterboard kiosk was placed in the bay to serve as an information office. An old wooden jetty stood on the site of the present-day jetty in front of the Grando warehouse until 1968, when it was finally destroyed by a powerful storm (Anon., 1983). Salt was unloaded on this jetty by hand using primitive equipment, a process that required great physical effort on the part of the saltworkers. Following the demolition of the jetty, all the salt (including "imported" salt from Koper and Umag) was transported by lorries and poured into hoppers located on the seaward side of the building. The production process was not fully mechanised in the salt warehouses until 1983 or 1984. In this period a new jetty was built next to the Grando warehouse (SGP Nova Gorica and subcontractors). This was designed to serve in the summer months for the "embarking or disembarking of motor vehicles and boats from passenger ships". A marine crane was also installed for the unloading of salt – capable of transferring 100 tons of salt in just one hour (Naš glas, 1983: 7). Repairs were carried out to the roof structure in the same period and a conveyor belt was installed on the ceiling of the Grando warehouse. The unloading of salt from ships via the crane now took place on a protected conveyor belt 5 m above the ground. Areas for milling, refining and packing sea salt and for the storage of packaging materials and finished products were created in the third bay of the Grando warehouse. Before this, the packaging machines were unsuitably installed in the same building, the electrical wiring was obsolete, the packing areas lacked heating and ventilation in winter and the compressor station was not properly regulated.

In 2014 the Monfort warehouse was partly renovated. The doorways on the seaward side were replastered, the deteriorated salonite roofing was replaced with brick tiles, and new guttering was installed. The mezzanine in the easternmost bay was damaged by a fire on 23 April 2014, so in 2017 the Municipality of Piran conducted a public procurement procedure covering the implementation of structural elements for the purposes of creating an information centre. Reconstruction began in 2018 (in the context of the EU project Mala Barka) with the renovation of the entire eastern part of the warehouse, which should in future serve as an information centre (PIA Studio 2017).

Status and social importance of the monument

The Monfort warehouse and the neighbouring Grando warehouse were proclaimed cultural monuments of local importance by the *Ordinance proclaiming cultural and histori-*

cal monuments within the territory of the municipality of Piran of 2 December 1983 (Official publications (*Primorske novice*), No. 26/83–379, 3/2009). The Monfort and Grando warehouses are entered in the Register of Cultural Heritage under Heritage No. (EŠD) 7207 (Fig. 11).

The Monfort warehouse and the Grando warehouse to the east of it are of considerable historical and scientific importance (in terms of technological development) in that they represent structures of early industrial heritage. They are large salt warehouses with a specific form of construction that was dictated by the function they served. At the time they were built, these imposing structures represented a considerable technical achievement. Furthermore, their shape and positioning are subordinated to their function of storing bulk material (salt) in large quantities. Ever since their construction, the monumental size of the two buildings has made them a characteristic element of the coastal region and part of the cultural landscape between land and sea. The Monfort warehouse also boasts a number of aesthetic elements (niches, triangular pediments, inscription, cornice).

The two salt warehouses are an important element of the Sečovlje saltworks complex. Of all the former saltworks on the Gulf of Trieste, only the Piran (Sečovlje) saltworks survive today. And of all the salt warehouses along the coast, only the Monfort and Grando warehouses continued to perform their original function until recent times. As such, they remain a precious testament to a former traditional sector of the economy. Through their monumentality they stand as a symbol of saltmaking, an activity that for long years was an important and integral part of the life and work of the people of Piran and represents a significant part of the identity of the local population. Saltmaking took its place alongside fishing and agriculture as one of the most important economic activities for the town of Piran. Numerous traditions and customs are associated with it.

Management and use of the buildings through history

The Grando warehouse has always had the same owner as the Monfort warehouse, so the two buildings have always shared the same management structure and undergone the same management-related changes.

It is only in recent years that the two warehouses have diverged in terms of their use. The Grando warehouse was exclusively used for the storage of salt from the time of its construction until 2014. One of its bays – number 2 – is still used for salt packing by the salt producer Soline d.o.o. The other spaces are leased by the owner (Municipality of Piran) to various tenants, who use them as warehouse spaces. The Monfort warehouse was exclusively used for the storage

of salt from the time of its construction until 1983. Built for the state saltworks administration and originally owned by the state, it then became the property of the food processing enterprise Droga Portorož (later Droga Kolinska). In 1983 Droga Portorož ceded one bay of the warehouse to the tourism enterprise THP Portorož, an event that marked the start of use of the warehouses for non-industrial purposes. The other bays continued to be used for their original purpose by Droga Portorož. In 1988 Droga Portorož established a subsidiary, Soline d.o.o, which took over use of the warehouse.

In 1994 socially owned property underwent a process of ownership transformation. Although the Monfort warehouse (along with the neighbouring Grando warehouse) was at that time in use by Droga Kolinska (or its subsidiary), the warehouses were excluded from ownership transformation under the legislation of the time, and ownership was transferred to the Municipality of Piran. At that time the two warehouses were already protected by the municipal ordinance on monuments. Under a special agreement concluded with the municipality, Droga Kolinska was granted the right to lease and use both warehouses for a period of 99 years.

In 1997 the municipal Council of the Municipality of Piran adopted the *Ordinance on the land-use plan for the coastal area between Bernardin and the salt warehouse in Portorož*. Among other things this ordinance envisaged the reconstruction of the Monfort warehouse and a change in its purpose of use, the reconstruction and partial change in the purpose of use of the Grando warehouse, and the widening and regulation of the beach with jetties in a narrow coastal strip.

In 2002 an amendment to the 1994 contract reduced Droga Kolinska's entitlement to lease the warehouses to a period of 25 years with the possibility of an extension. In 2002 the company Soline d.o.o. was acquired by Mobitel d.d. In 2012 the Municipality of Piran and Droga Kolinska mutually agreed to dissolve the contract granting the right of use of the warehouses, after which use of the warehouses passed to the municipality.

In 2013 the Municipality of Piran invited submissions of outline solutions for the regulation of the area of the salt warehouses. A competition was also prepared, but not implemented. That same year the promenade by the warehouses was closed to traffic and converted to a pedestrian area. Today the Municipality of Piran, the owner of the structures, is also responsible for their management, via the municipal administration. Unfortunately management is divided between the mayor's office and several other offices of the municipal administration and is carried out in a partial manner. The mayor's office is responsible for marketing; the Economy and Tourism Office and the Autonomous Investment Service are responsible for the implementation of European projects; and the Social Activities Office is responsible for contents. Funds are provided for capital expenditure and improvements to the structure by the Municipality of Piran under the budget item "Remedi-

¹ Curator for early maritime history at the Sergej Mašera Maritime Museum, Piran.

ation of salt warehouses in Portorož”.

The Municipality of Piran leases bay 1 (at the east end of the building) to the Piran-based Sergej Mašera Maritime Museum, which uses it to house and present its collection of boats and other vessels. Bay 4 is used by the Obalne Galerije Piran/Gallerie Costiere Pirano art galleries. The central bays are occasionally rented out for events of various kinds. A museum of tourism was also based in the building for a short period. A Mercator supermarket occupies bay 5 (at the west end of the building).

Serviceability of the building for the planned activities and methodology of evaluation

Existing state of the buildings, vulnerabilities and threats

The Grando building, although poorly maintained, is in a relatively good state. The wooden roof structure has deteriorated in places and the salonite roofing is unsuitable. The biggest problem is represented by damp and the unfavourable weather conditions linked to the aggressive marine atmosphere. The short overhang of the roofs of both buildings is another problem, since this means that the façades are exposed to rainfall for up to two thirds of their height (up to 6 m). As a result, moss and other vegetation develop, particularly on the north side of the buildings. Attempts were made in the past to protect the façades using unsuitable plasters and more modern whitewashes, but despite this the material continues to come away from the base.

A further cause of damage, besides damp, is the traffic passing on the northern side of the area, along the road that is the main connection between Piran and Portorož. The vibrations caused by vehicles cause a widening of cracks in the pavement and walls. Only urgent maintenance is carried out in the interior of the buildings.

Even greater development pressures are to be expected in the future because of the location of the monument. The abandoning of the activity of salt storage and an incorrect selection of new activities could lead to a reduction in the cultural importance of the monument.

The Monfort warehouse and its surrounding area are in a relatively good state. Plaster is missing from the façade in places. The sandstone walls are already badly eroded in these places. Cracks are visible in the building and need repairing as soon as possible. The roof of the Monfort warehouse, covered in brick tiles, is new. Gutters have been replaced on most of the building, with the exception of bay 5, which houses the supermarket.

The biggest problem is represented by damp and the un-

favourable weather conditions linked to the aggressive marine atmosphere. The badly damaged south façade of the Monfort warehouse shows signs of superficial rot in the area where rising damp is present, revealing a structure that is for this reason even more exposed to decay. The short overhang of the roofs of both buildings is another problem, since this means that the façades are exposed to rainfall for up to two thirds of their height (up to 6 m). As a result, moss and other vegetation develop, particularly on the north side of the buildings. Tall trees next to the building are a problem, since the walls consequently dry more slowly. Attempts were made in the past to protect the façades of the buildings using unsuitable plasters and more modern whitewashes, but despite this the material continues to come away from the base.

A further cause of damage, besides damp, is the traffic passing on the northern side of the area, along the road that is the main connection between Piran and Portorož. The vibrations caused by vehicles cause a widening of cracks in the pavement and walls.

Significant development pressures are to be expected in the future because of the location of the monument. The abandoning of the activity of salt storage and the potentially incorrect selection of new activities could lead to a reduction in the cultural importance of the monument. Acceptable changes and possible uses of the building are defined in the document *Starting points for concepts of use of the Monfort and Grando warehouses* (Plestenjak et al., 2018).

The following are assessed as suitable uses:

- Storage of salt: the primary use of the building should be retained at least in part of the structure (Plestenjak et al., 2018, 47; section 01-7.3.4.1).
- Cultural contents: the introduction of museum activity or other cultural and public functions is acceptable. Part of each of the buildings should be dedicated to interpretation of the buildings themselves and their original purpose of use (Plestenjak et al., 2018, 47; section 01-7.3.4.2).
- Activities related to the sea: long-term use should be connected with the sea – continuity of access by sea – transport to saltworks, a connection with archaeological remains and sunken wrecks (ships, seaplane) (Plestenjak et al., 2018, 47; section 01-7.3.4.4).

Planned contents

In 2013 the Municipality of Piran invited submissions of variant solutions for the area of the two salt warehouses. The aim of this process was to obtain the most suitable solution for the area from the content/programmatic, urbanistic, landscape and architectural points of view. It may be supposed that the selected idea is still current today. The winning submission, from Boštjan Voda, envisaged the division of the Grando warehouse into a multipurpose events space in the westernmost bay and a combined shopping and

food court in the other three. For the Monfort warehouse, Voda's solution envisaged a continuation of predominantly cultural contents: a tourist information centre (bay 4), a gallery and research space (bay 3), a museum dedicated to tourism and the history of Piran and Portorož (bay 2) and a youth cultural centre (bay 1). The plan also envisaged a new area for municipal moorings in front of both buildings.

Notwithstanding this solution, the Municipality of Piran joined the REFREsh project with an idea for arranging the third bay of the Monfort warehouse as a multipurpose space for various events that could be used by various creative industries. The study “Revitalisation concepts for the Monfort warehouse” prepared by GEArt, vizualne komunikacije, d.o.o. (Savinjska cesta 4, 3331 Nazarje), looked at possibilities of using the space as:

1. venue for ceremonial functions and events,
2. venue for food and drink events,
3. “presentation room” for outside clients.

In order to define the use of the spaces in the Grando warehouse and bay 2 of the Monfort warehouse, several consultations were also held with local groups on the context of the REFREsh project in order to try and identify the local community's needs with regard to the use of the spaces.

The following needs were identified:

- spaces for socialising and creative activities (youth cultural centre, intergenerational centre, business incubator, co-working space, practice rooms for groups of young musicians, creative workshops, etc.),
 - sports hall (multipurpose facility for basketball, beach volleyball, skateboarding, fitness, etc.),
 - shops selling local products,
 - cafés and bistros.
- On the basis of the above, a list was drawn up of the various activities that could potentially take place in the building. These were then rated in terms of their suitability and their impact on the monument.

Methodology for assessing the suitability of proposed new uses

The principal aim of the REFREsh project is to identify a new use for industrial heritage in a manner that will satisfy the needs of the creative industries and at the same time conserve heritage and its valuable characteristics – or further emphasise them. For this reason, an assessment of the use of the structures for any future new use was an important part of the project. Our starting point was the idea that all the functions set out by potential users are in principle acceptable, although assessment is required of whether the space is actually suitable for the desired functions and, on the other hand, of the scale of the impact that a specific new use would represent for the structure. A comparison of the results of assessment would enable us to determine which use would be most suitable.

We have put the results together in the form of a table. The first part relates to the new use of the buildings and lists all the functions and activities in which interest has been expressed. For each activity we studied the size and type of space required and the equipment and new installations that would be necessary.

The second part of the table contains an assessment of the suitability of the building for the activity in question, with the help of a four-point scale: 1 – the building is suitable; 2 – the building is suitable with limitations; 3 – the building is not suitable without major changes; 4 – the building is not suitable. The explanation lists the limitations or weaknesses of the current situation, while we also identified the minimum changes to the building that would be necessary in order to permit a specific function. Finally, we compared the selection with the impacts that the function and/or changes in question would represent for the monument. We evaluated this with the help of a four-point scale: 1 – no impact; 2 – small impact; 3 – large impact; 4 – maximum impact.

In this way we showed both the owner (the Municipality of Piran) and representatives of the local community the best possibilities of use of the two buildings in a very clear manner and without ruling out any options in advance. Those functions that are not suitable for a heritage site and would at the same time represent the most significant intervention in the fabric of the monument also proved to be the least affordable. For the Monfort warehouse, it was thus established that both bay 3 and bay 2 are big enough for each of the listed activities. Regardless of the activity, not all the infrastructure needed for the reception of large numbers of people is currently present. The building does not have sufficient toilet facilities for a large number of visitors. These facilities would need to be provided inside the building or in the immediate vicinity.

Table 1: Overview of spatial requirements in the two buildings and verification of the suitability of each building for specific activities, by Ana Pleste-njak.

| GROUP | FUNCTION* | ACTIVITY | SPACES REQUIRED | EQUIPMENT REQUIRED | INSTALLATIONS AND SPECIAL REQUIREMENTS | FLOOR AREA REQUIRED (m ²) | SUITABILITY OF BUILDING | | CHANGES REQUIRED | IMPACT ON MONUMENT |
|-----------------|-----------------------------------|---|--|--|---|---------------------------------------|--|--|--|--------------------|
| | | | | | | | assessment | explanation | | |
| C U L T U R A L | EXHIBITION SPACE; GALLERY, MUSEUM | exhibitions, seminars, conferences, meetings, courses | lecture rooms, workshops, cloakrooms, event/exhibition space, studios/workshops | panels, display cases, illumination, surveillance and security equipment | heating, electricity, internet, telephone | no limitation | 2 - building suitable with limitations | damp in the space makes it unsuitable for the presentation of collections, temperature in the space is variable, limitation regarding exhibits | determine the maximum number of visitors | 2 - LOW |
| | CONCERT HALL | concerts | multipurpose events space, backstage, cloakrooms, storeroom, | chairs, projectors, screens, projection screen, stage | heating, electricity, internet, telephone, water, drainage, air conditioning, lighting, public address system | no limitation | 2 - building suitable with limitations | increased decibels will necessitate checking the static stability of the building | determine the maximum number of visitors | 3 - HIGH |
| | MULTIPURPOSE HALL | performances / theatre, cinema/, meetings, courses, exercise, education | multipurpose events space, backstage, workshops, cloakrooms, storeroom, service facilities | chairs, projectors, screens, projection screen, stage | heating, electricity, internet, telephone, water, drainage, air conditioning, lighting, public address system | no limitation | 1 - building suitable | damp, temperature | determine the maximum number of visitors | 3 - HIGH |
| | ARCHIVE, REPOSITORY | storage of documents, equipment | library, storeroom, workshops | rack storage unit | heating, electricity, internet, telephone, air conditioning | no limitation | 3 - building suitable with major alterations | | arrange the space as a "box within a box" - create a new functional microclimate | 4 - HIGHEST |

*toilet facilities, security and fire safety need to be provided for the functions of all the spaces

| GROUP | FUNCTION* | ACTIVITY | SPACES REQUIRED | EQUIPMENT REQUIRED | INSTALLATIONS AND SPECIAL REQUIREMENTS | FLOOR AREA REQUIRED (m ²) | SUITABILITY OF BUILDING | | CHANGES REQUIRED | IMPACT ON MONUMENT |
|---------------------|------------------------------------|--|---|---|---|---------------------------------------|--|--------------------------|--|--------------------|
| | | | | | | | assessment | explanation | | |
| E D U C A T I O N | STUDY, STUDIO | creative workshops, co-working space | workshops, etc. | chairs, tables, shelving, computer equipment, bookshelves | heating, electricity, internet, telephone, ventilation | min. 3m ² / person | 1 - building suitable | damp, temperature | partition walls, natural light | 2 - LOW |
| | INTERGENERATIONAL CENTRE | creative workshops, courses, | lecture rooms, workshops, etc. | chairs, tables, shelving, computer equipment | heating, electricity, internet, telephone, ventilation | no limitation | 1 - building suitable | damp, temperature | natural light preferable | 2 - LOW |
| | LECTURE ROOM, MULTIMEDIA SPACE | courses, conventions, conferences, education, meetings | events space, warehouse, service facilities | chairs, tables, projectors, panels, desk | heating, electricity, internet, telephone, air conditioning | 100 m ² / 100 people | 1 - building suitable | damp, temperature | | 2 - LOW |
| T O U R I S M | TOURISM OFFICE - INFORMATION POINT | provision of information, promotion, education | office, bookshop, souvenirs | chairs, tables, panels, display cases, illumination | heating, electricity, internet, telephone, illumination | no limitation | 1 - building suitable | damp, temperature | partition walls | 2 - LOW |
| | WINE CELLAR - WINE BAR | tastings, catering, storage | space for guests | chairs, tables, bar, refrigerators | electricity, internet, telephone, heating, water, drainage | 1m ² / person | 2 - building suitable with limitations | damp, temperature, smell | beverages are cooled in refrigerators brought in for the purpose; in the case of cellar, a special "box in a box" microclimate needs to be created | 2 - LOW |
| F O O D / D R I N K | CAFÉ, TEA ROOM | consumption of hot beverages | space for guests | chairs, tables, bar | electricity, internet, telephone, heating, water, drainage | 1.5m ² / person | 1 - building suitable | damp, temperature, smell | | 2 - LOW |

| GROUP | FUNCTION* | ACTIVITY | SPACES REQUIRED | EQUIPMENT REQUIRED | INSTALLATIONS AND SPECIAL REQUIREMENTS | FLOOR AREA REQUIRED (m ²) | SUITABILITY OF BUILDING | CHANGES REQUIRED | IMPACT ON MONUMENT |
|--------------|----------------------------|---|--|--|---|---------------------------------------|--|--|--------------------|
| | | | | | | | assessment | explanation | |
| FOOD / DRINK | RESTAURANT | tastings, catering | space for guests, serving area, kitchen, toilets | chairs, tables, bar | electricity, telephone, heating, water, drainage, ventilation | 1.8m ² / person | 2 - building suitable with limitations | damp, temperature, smell create a suitable climate for tastings, consideration should be only given to fresh service | 3 - HIGH |
| | RESTAURANT KITCHEN | social activity, food preparation, | space for guests, scullery, cold store, store rooms, cloakroom, goods reception area | chairs, tables, bar, equipment for food preparation and service, cupboards | heating, electricity, telephone, water, drainage, air conditioning, ventilation | 6 m ² / per person | 4 - the building not suitable. | damp, temperature, smell arrange the space as a "box within a box" - create a new functional microclimate, suitable ventilation necessary | 4 - HIGHEST |
| BUSINESS | BUSINESS PREMISES, OFFICES | business incubator, advertising, sales, workshop, office activity | offices, kitchennette | tables, chairs, shelves, cupboards, partition walls | electricity, water, telephone, internet, ventilation, heating, air conditioning, need for natural light | 3m ² / person | 3 - building suitable with major alterations | damp, temperature install multiple openings, arrange the space as a "box within a box" - create a new functional microclimate, suitable ventilation necessary | 4 - HIGHEST |
| | SHOP | sales | shop floor, store room | shelves, counters, tables, chairs | electricity, water, internet, telephone, heating | no limitation | 3 - building suitable with major alterations | damp, temperature arrange the space as a "box within a box" - create a new functional microclimate, suitable ventilation necessary | 4 - HIGHEST |
| | MARKET | sales, fairs, tastings | | counters, tables | electricity, water, drainage, ventilation | no limitation | 2 - building suitable with limitations | damp, temperature, smell create a new functional microclimate, suitable ventilation necessary | 2 - LOW |

| GROUP | FUNCTION* | ACTIVITY | SPACES REQUIRED | EQUIPMENT REQUIRED | INSTALLATIONS AND SPECIAL REQUIREMENTS | FLOOR AREA REQUIRED (m ²) | SUITABILITY OF BUILDING | CHANGES REQUIRED | IMPACT ON MONUMENT |
|-------------------------|-------------------------|--|--|---|--|--|--|--|--------------------|
| | | | | | | | assessment | explanation | |
| SPORTS | FITNESS CENTRE | exercise, recreation | fitness studio, reception area, showers, cloakroom | bar, table, exercise equipment | electricity, heating, water, drainage, ventilation, air conditioning | 50-200 m ² | 3 - building suitable with major alterations | arrange the space as a "box within a box" - create a new functional microclimate, suitable ventilation necessary | 4 - HIGHEST |
| | SPORTS HALL | exercise: hockey (20 x 40 m), 5-a-side football and handball (20 x 40 m), gymnastics, basketball (26 x 14 m), volleyball (18 x 9 m), tennis (36.5 x 18.3 m), badminton (13 x 6 m), boules (24 x 3 m) | playing surfaces, cloakroom, showers | depends on purpose of use | electricity, heating, water, drainage, ventilation, air conditioning | see activity | 1 - building suitable | ventilation | 2 - LOW |
| | SAUNA, SPA, whirlpool | pleasure :) | cloakroom, baths, showers, | furnace, water boiler, pools, saunas, recliners, chairs, solarium | electricity, heating, water, drainage, ventilation, air conditioning | no limitation | 3 - building suitable with major alterations | arrange the space as a "box within a box" - create a new functional microclimate, suitable ventilation necessary | 4 - HIGHEST |
| GROUP | CLUB PREMISES | social activity, equipment storage | offices, club room, storage area, workshop | depends on purpose of use | electricity, internet, telephone, heating, water, drainage | no limitation | 1 - building suitable | | 2 - LOW |
| | ROOM WITH BATHROOM | overnight accommodation | residential studio, sanitary facilities | bed, wardrobe, table, chair | electricity, water, drainage, internet, telephone | 18 m ² / 2 people | 3 - building suitable with major alterations | arrange the space as a "box within a box" - create a new functional microclimate, suitable ventilation necessary | 4 - HIGHEST |
| DORMITORY ACCOMMODATION | overnight accommodation | residential studio, sanitary facilities | bed, wardrobe, table, chair | electricity, water, drainage, internet, telephone | 8m ² / person | 3 - building suitable with major alterations | arrange the space as a "box within a box" - create a new functional microclimate, suitable ventilation necessary | 4 - HIGHEST | |

Social benefits of new contents in the two buildings

On the basis of the assessment presented in the above table, and in accordance with the wishes of the local population, we selected some of the most suitable functions.

The majority of spaces in the Monfort warehouse, which have a total usable area of 2,280 m², already have contents that are to a large extent provided by representatives of the cultural and creative industries. For this reason, in our analysis of suitability we only considered the new proposals listed above for bays 3 and 2. All the proposals envisage minimal interventions in the fabric of the monument and are reversible. The new functions (Fig.12) would include, alongside the existing uses (Mercator supermarket, Obalne Galerije/Gallerie Costiere exhibition space, Maritime Museum exhibition space), a multipurpose space for ceremonial functions and events and events connected to food and drink in bay 3 and a salting interpretation centre in bay².

The new contents of the Monfort warehouse would therefore build on the existing programme: alongside the existing exhibition spaces of the Obalne Galerije and the Maritime Museum, bay 3 would continue to be dedicated to ceremonial functions and events, while bay 2 would serve as a salting interpretation centre that will also allow the possibility of occasional uses and connections with creative activities. The current use of the third bay, in particular since the summer of 2019, is increasingly open to specific presentations of contemporary creative practices, from music to the visual and digital arts.

The space available in the Grando warehouse is 4,525 m² in four bays. We studied the following programmatic solutions in more detail (Fig. 13):

1. Sports hall – bay 1,
2. Fitness centre with massage and sauna area and changing rooms – bay 2,
3. Intergenerational centre and co-working centre – bay 3,
4. Shopping and food court – bay 4.

The table below lists the socio-economic benefits that the Monfort warehouse would obtain with the new function:

| DIRECT BENEFITS | INDIRECT BENEFITS |
|---|---|
| - Establishment of a new cultural centre in the coastal region | - Starting point for getting to know the wider surrounding area |
| - Revenue could cover the costs of regular maintenance currently borne by the owner - high-quality marketing needed | - Secondary income for local population (snack bars, restaurants, shops, accommodation, etc.) |
| - Employment in the context of the buildings' new functions | - Employment in secondary sectors (service activities) |
| - In the long term there is the possibility of employment of marketing personnel | |
| - Development of creative and cultural industries in the Municipality of Piran | |
| - Increase in visitor numbers (tourism) due to cultural activities | - Redistribution of tourists from existing attractions to currently less interesting areas |
| | - Change in tourist flows - events taking place throughout the year |
| | - Landscaping of the surrounding area |
| | - Establishment of a promenade between Portorož and Bernardin |

Table 2: Direct and indirect benefits of the Monfort building with the new function

The table below lists the socio-economic benefits that the Grando warehouse would obtain with the new function:

| DIRECT BENEFITS | INDIRECT BENEFITS |
|--|---|
| - Creation of a new social gathering point for the local population (intergenerational centre) | - Satisfaction of local population |
| - Spaces for creative enterprise | - Promotion of local products |
| - New sports and recreation centre | |
| - Revenue enables coverage of maintenance costs | - Secondary income for local population (snack bars, restaurants, shops, accommodation, etc.) |
| - New jobs | - Employment in secondary sectors (service activities) |

Table 3: Direct and indirect benefits of the Grando building with the new function

The selection was made primarily with regard to the wishes of the local community. We also took into account the suitability of the building and the impacts on the monument. At the same time we are also aware of the importance of the sustainable use and maintenance of the building, so the functions selected included both cultural/creative activities and commercially oriented functions. The building would include sports activities for recreation and a space for support activities for sport; the second bay would be used for creative workshops and an intergenerational centre, while the first bay (opposite Monfort) would house a shop selling local products and a restaurant serving meals made with these products.

Our analysis included all possible functions, including those which a conservator would immediately reject out of hand. We decided, however, not to exclude any suggestions *a priori* and instead to collaborate with interested sections of the public. The analysis clearly showed that those functions that are not suitable for the monument would at the same time represent the most significant interventions in its fabric. They also proved to be the least affordable. In this way we established a constructive dialogue with the public, who accepted the presented results with satisfaction. Although this is only a study which will not be carried into practice, the result is a document that directs the owner (the Municipality of Piran) towards a reflection on future use that will have the least possible impact on the monument.

Conclusion

The industrial heritage of the Monfort and Grando salt warehouses in Portorož has a high social importance: they are the only two historical salt warehouses that still exist in the Municipality of Piran and, most significantly, both of them retained their original function until recently. A change in their original purpose of use has offered opportunities for diverse activities to develop in their spacious interiors. The building further to the west, Monfort, has already housed cultural contents for a number of years, while in the context of the REFRESH project we developed starting points for the insertion of additional contents from the field of the cultural and creative industries. Since the Monfort warehouse and the neighbouring Grando warehouse form a single spatial unit, and above all are historically connected, we included both buildings in our analysis of potential new uses. We compared the proposed new uses against the requirements they would involve and the limitations represented by the buildings. Finally, we compared them from the point of view of the impact on the monument.

Summary

The article considers possibilities for the inclusion of the cultural and creative industries in the revitalisation of two abandoned salt warehouses: the Monfort and Grando warehouses in Fazine, between Portorož and Bernardin. The buildings stand on a quay constructed on the seabed which ends with stone jetties on the seaward side. The two warehouses are massive buildings with long, rectangular floor plan, built between 1824 and 1838. The reason for their construction was increased salt production and the consequent need to store salt in central state warehouses. The two buildings served their original purpose – that of storing salt – from the time of their construction until quite recently. Salt storage in the Monfort warehouse came to a complete end in 2012. One bay today houses a Mercator supermarket, another is used by the Obalne Galerije Piran/Gallerie Costiere Pirano art galleries, the central two are occasionally hired out for cultural events by their owner,

the Municipality of Piran, while the easternmost bay is used by the Sergej Mašera Maritime Museum (Piran) to store and present its collection of boats and other vessels. The neighbouring building, known as Grando, still serves as a warehouse, with space leased to various users. Only the central bay, which is leased to Soline d.o.o., still serves its original function in that it is used for the warehousing and packaging of salt. Other goods are stored in the other bays. Consisting of large, covered and interconnected spaces, the warehouses offer numerous opportunities for better use by today's society. This is something that has been highlighted in the strategic documents of the municipality in the context of tourism potentials. The Municipality of Piran wishes to include the creative industries in the revitalisation, so the REFRESH project included verification of the possibility of transforming the third bay of the Monfort warehouse into a cultural/entertainment centre. There is, in fact, a distinct lack of spaces/venues for major public events along the Slovenian coast. In this paper we present the development of the buildings and an analysis of the various possibilities of use of the two warehouses. For each of the potential new functions, the spatial requirements are defined and the suitability of the building for this type of use is analysed, along with the principal weaknesses. The principal changes that would be necessary in the case of the new use in question are also listed. Since this is a conceptual feasibility study, particular consideration is given to technical feasibility. We conclude with a socio-economic benefits analysis.

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Miha Murko

Arheološka izkopavanja na območju nadvišanja za umik divjadi na območju HE Brežice

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Izvleček

Poleti 2015 je Zavod za varstvo kulturne dediščine Slovenije, Center za preventivno arheologijo, izvedel arheološka izkopavanja na območju predvidenega nadvišanja za umik divjadi za HE Brežice. Med raziskavami so bili odkriti skromni dokazi antropogene uporabe prostora v preteklosti. Poleg večje količine lončenine in drugega drobnega gradiva, odkritega večinoma v ornici, smo izkopali večjo odpadno jamo in temelje manjšega objekta; oboje je bilo v funkciji v času, ko se je na širšem območju razprostirala novoveška vas Zasavje.

Uvod

Zavod za varstvo kulturne dediščine, Center za preventivno arheologijo, je na podlagi kulturnovarstvenega soglasja za raziskavo in odstranitev arheološke ostaline št. 62240–146/2015/3 z dne 9. 6. 2015 izvedel arheološka izkopavanja na območju predvidene gradnje nadvišanja za umik divjadi za HE Brežice, na parc. št. 1823/1, 1823/2, 1840/1, 4795/27, 4795/28, vse k. o. Krška vas. Obravnavane parcele ležijo znotraj območja, ki je v registru nepremične kulturne dediščine vpisano kot Krška vas – arheološko najdišče Zasavje (EŠD 10782). Raziskave so bile omejene na območje bodočega nasipa, ki zajema prostor, velik približno 128 x 20 m. Na tem območju smo izkopali in dokumentirali površino velikosti pribl. 2130 m². Strojni izkop je segal od 0,30 do 1,50 m globoko (strojno smo odstranili pribl. 2000 m³ zemljine).

Miha Murko, Zavod za varstvo kulturne dediščine Slovenije

Arheološke raziskave so bile izvedene pod vodstvom Mihe Murka, univ. dipl. arheologa, julija in avgusta 2015. Arhiv raziskave in dokumentacijo začasno hrani ZVKDS, CPA. Obravnavano območje leži neposredno ob avtocesti Ljubljana–Obrežje in približno 600 m severno od Krške vasi. Z jugozahodne strani je omejeno z današnjo avtocesto, s severovzhodne pa s strugo reke Save. Geološko podlago raziskanega območja predstavlja peščen prod mešane, pretežno karbonatne sestave, ki je savska naplavina. Območje leži na najmlajši savski terasi, ki je nastala v holocenu z vrezovanjem oziroma erozijo v lasten pleistocenski zasip (Rižnar, 2015). Morfologija površine kaže na večje število opuščenih kanalov oziroma rokavov, ki jih je za sabo pustila reka Sava. Iz zgodovinskih kart je moč razbrati, da je bil tok reke Save v 18. in 19. stoletju zelo nestalen in da ga je reka velikokrat spremenila, s tem pa je spremenila tudi strugo. Ta se je nazadnje spremenila v drugi polovici 19. in prvi polovici 20. stoletja, ko so regulirali tok reke in s tem popolnoma spremenili videz pokrajine ter s tem tudi območja raziskav (Mlekuž, Pergar, 2009: 5).

Zgodovina območja in raziskav

Območje raziskav leži znotraj zaščitenega arheološkega najdišča, ki je v registru nepremične kulturne dediščine vpisano kot Krška vas – arheološko najdišče Zasavje (EŠD 10782). Tukaj naj bi vas Zasavje stala do leta 1781, ko so jo

uničujoče poplave v celoti razdejale oziroma odplavile. Po teh poplavah so vas le deloma obnovili in naselili, na začetku 20. stoletja pa so jo dokončno zapustili.

Nestanovitnost struge je razvidna tako iz morfologije terena kot tudi iz historičnih kart (Černe, Veršnik in Rižnar, 2016: 10). Struga se je nazadnje spremenila v drugi polovici 19. in v prvi polovici 20. stoletja, ko so regulirali tok reke in s tem popolnoma spremenili videz pokrajine in območja raziskav (Mlekuž, Pergar, 2009: 5; Lazar, 2015: 8–9).

Prva obsežnejša regulacijska dela na reki Savi so se začela v prvi polovici 18. stoletja, ko se je spremenil gospodarski in vojaški položaj avstrijske monarhije. Potreba po izboljšanju plovnosti reke Save je nastala predvsem iz nuje hitrega premeščanja vojaških čet kot tudi iz želje po vzpostavitvi boljše trgovske povezave z novo osvojenimi deželami na Balkanu. Regulacijska dela so zajemala čiščenje bregov, razstrelitev skal na bregu in v vodi, prerez meandrov ter izgradnjo novih strug in vlečnih poti, po katerih so ljudje in živina vlekli ladje gorvodno. Na območju Vrbine, kjer je obravnavano območje raziskav, se je okoli leta 1775 začelo urejanje struge, okoli leta 1830 pa je bil že zgrajen sistem vlečnih poti, ki je na odseku med Brežicami in Krškimi potekal izmenoma po levem in desnem bregu, odvisno od vodostaja (Gaspari in Erič, 2005: 32). Z izgradnjo železniške proge Zidani Most–Sisek leta 1862 je pomen Save kot prometne poti in s tem tudi pomen vlečne poti usahnil (Umek, 1986).

V drugi polovici 19. stoletja so se začela obsežna regulacijska dela z izkopom umetne struge Save ter utrditvijo brežine s klesanimi apnenčastimi bloki. Natančen potek del ni znan, a z geološke karte iz leta 1858, ki je bila leta 1908 prerisana na novo topografsko enoto, je mogoče razbrati, da je bil umetni kanal že izkopen, vendar se je voda še vedno zadrževala v starih strugah. Z nemške karte iz leta 1943 pa se lahko razbere, da so bila regulacijska dela na Savi končana (Verbič in Berič, 1993–1994: 333). Ostanke utrditve brežine so bili odkriti vzdolž desnega brega pri Šmarčni (Gaspari in Erič, 2004: 8), Boštanju (Gaspari in Erič, 2004: 11), Logu (Gaspari in Erič, 2005: 6–7; Ravnik in Predan, 2008), Blanci (Bajde, 2006) in Spodnjih Guntah (Gaspari in Erič, 2005: 22; Olič, 2011: 3). Na tem odseku Save je ohranjenih tudi več ločnih mostov iz natančno klesanih apnenčastih blokov, po katerih je potekala pot, ki je prečkala potoke, izlivajoče se v Savo (Gaspari in Erič, 2005: 32).

Na območju raziskav je stala poznosrednjeveška in novo-veška vas Zasavje, o kateri pričajo pisni in kartografski viri ter posamezne ostaline mlajših objektov. V pisnih virih se vas prvič omenja v urbarju iz leta 1525 kot Dolene Sassaue oziroma Spodnji otok (Kos, 1957: 8), s petimi kmetijami, sedmimi osebenjskimi enotami ter dvema opuščanima kmetijama (Koropec, 1976: 105). V starejšem urbarju iz leta 1498 ta kraj še ni naveden kot Zasavje, temveč kot Spodnja Vrbina (Koropec, 1976: 105). Po mlajših urbarialnih popisih je število domačij nihalo. Leta 1719 je bilo zabeleženih sedemnajst domačij, leta 1726 devetnajst večjih kmetij, pet manjših kmetij na srenjski zemlji (Untersassen) in dve ka-

jži, leta 1737 triindvajset domačij, leta 1741 osemnajst večjih kmetij, štiri manjše kmetije na srenjski zemlji in dve kajži, leta 1760 štirinajst večjih kmetij, štiri manjše kmetije in dve kajži, leta 1771 dvajset velikih kmetij, pet manjših kmetij in dve kajži, leta 1783 devetnajst večjih kmetij in pet manjših. Po tem letu se je začelo število domačij zmanjševati. Do leta 1824 se je zmanjšalo na dvanajst, leta 1858 jih je bilo še šest, leta 1892 pa še dve. Leta 1901 so prebivalci opustili zadnji dve domačiji ter se naselili v Krški vasi (Smukovič, 2014: 746–750, Župnija Cerklje ob Krki). Vzrok za postopno preseljevanje prebivalcev iz Zasavja v okoliške vasi, predvsem v Krško vas, je bila poplavna ogroženost. Predvsem je bila prelomna poplava konec januarja 1781, ko je Sava spremenila tok in si utrla novo strugo. Pri tem je odnesla skoraj vso vas: 14 hiš in cerkev sv. Nikolaja. Ta dogodek je zabeležen v samostanski kroniki brežiških frančiškanov *Diarium Conventus Runensis ab anno 1752 usque ad annum / 24 augusti anni 1892*. V to kroniko so kronisti zapisovali vse, kar se je bratom pripetilo znotraj in zunaj samostana (Škofljanec, 2001: 206). Podružniška cerkev sv. Nikolaja je stala ob poti, ki je vodila iz Brežic v Skopice (Škofljanec, 2001: 207), na mestu današnje struge Save (Smukovič, 2014: 746). Imela je tri oltarje, posvečene zavetniku cerkve ter sv. Juriju in sv. Katarini, devici in mučeniku (Škofljanec, 2001: 207). Po uničujoči poplavi je bila podoba svetnika po slovesni maši odnesena v cerkev sv. Roka v Brežicah, oltar pa je bil eksekriran (Škofljanec, 1996: 41).

Po opustitvi vasi je bilo to območje kmetijska površina, ki je bila velikokrat izpostavljena poplavam. To potrjujejo tudi debeli nanosi rečnih sedimentov, ki prekrivajo celotno območje (Černe, Veršnik in Rižnar, 2016: 10).

Zelo izpoveden vir o vasi so tudi historične karte. Najstarejši prikaz vasi Zasavja je na Florjančičevi karti *Ducatus Carnioliae Tabula Chorographica* iz leta 1774, na kateri je poleg topografskega imena Safsauie vrisana tudi cerkev sv. Nikolaja na poti med Brežicami in Skopicami (Černe, Veršnik in Rižnar, 2016: 10).

Na jožefinskem vojaškem zemljevidu prve izmere (1763–1787), na katerem so, glede na prej omenjeno karto, poleg cerkva in gradov vrisani tudi drugi objekti, je na območju vasi Zasavje vrisanih štirinajst objektov, a brez cerkve sv. Nikolaja. Karta, ki je bila izdelana kmalu po katastrofalni poplavi iz leta 1781, tako potrjuje uničenje cerkve ter obenem prikazuje natančnejšo lokacijo ohranjenega dela vasi (Černe, Veršnik in Rižnar, 2016: 10).

Število štirinajstih objektov na karti pa se ne ujema s popisom števila domačij v urbarju iz leta 1783, v katerem je zabeleženih 24 domačij. Zelo verjetno gre za nenatančen izris na karti. Da je res tako, potrjuje tudi karta reke Save iz leta 1807 (Černe, Veršnik in Rižnar, 2016: 11), ki prinaša natančnejši izris več kot dvajsetih objektov.

S kart je razvidno, da se je Sava med letoma 1807 in 1824, ko je bil izdelan franciscejski kataster, pomaknila še bolj proti jugu in uničila najsevernejšo skupino hiš (Černe, Veršnik in Rižnar, 2016: 12). Ohranila sta se le osrednji in zahodni

del vasi. Pet objektov pa se prvič pojavlja vzhodno od jedra vasi. To je razvidno tako iz franciscejskega katastra (Černe, Veršnik in Rižnar, 2016: 10) kot z jožefinskega vojaškega zemljevida druge izmere (1829–1835) (Černe, Veršnik in Rižnar, 2016: 12).

Podobna razdrobljenost vasi Zasavje je tudi na karti odseka Save od Krškega do Brežic iz leta 1839 (Černe, Veršnik in Rižnar, 2016: 10), vendar z manjšim številom objektov v zahodnem in osrednjem delu vasi. Porast objektov pa je v vzhodnem delu, kjer se tudi prvič pojavi ime Carlowetz. Množično opuščanje vasi v drugi polovici 19. stoletja je poleg urbarialnega popisa vidno tudi na karti jožefinskega vojaškega zemljevida tretje izmere (1869–1887), na kateri je izrisanih le sedem objektov (Černe, Veršnik in Rižnar, 2016: 13); to se skoraj sklada z navedbo šestih domačij v urbarju iz leta 1858.

Območje je bilo tudi arheološko raziskano. Prve raziskave v obliki ekstenzivnega terenskega pregleda so potekale leta 1998 na predvideni trasi današnje avtoceste, kjer so odkrili odlomke srednjeveške in novoveške keramike, gradbenega materiala ter razorane arhitekturne ostanke (obdelane apnenčaste kamne) opuščanih objektov nekdanje vasi (Pinter, 1998: 11).

Leta 2008 je bila izdelana analiza lidarskih posnetkov poplavne ravnice Save na Vrbini z namenom, da bi ugotovili obstoj in ohranjenost arheoloških struktur ter identificirali spremembe v pokrajini. Raziskava je pokazala, da je Sava v zadnjih 200 letih močno preoblikovala holocensko poplavno ravnico, pri čemer so se ohranili le posamezni otoki/pasovi starejše površine (Mlekuž, 2008; Mlekuž, 2009; Mlekuž, 2009–2010).

Obširnejše terenske raziskave so potekale med letoma 2007 in 2009 v sklopu gradnje HE Brežice z ekstenzivnimi in intenzivnimi arheološkimi pregledi na desnem in levem bregu Save od Krškega do Brežic. Na območju Zasavja so med raziskavami odkrili večjo koncentracijo novoveških najdb in obdelanih apnenčastih kamnov. Leta 2007 so bili še vidni ostanke temeljev (Mlekuž in Pergar, 2009).

Na podlagi rezultatov predhodnih raziskav so bile leta 2009 izvedene tudi arheološke raziskave v obliki izkopa ročnih testnih sond, v katerih so tudi odkrili odlomke novoveške keramike ter stavbne ostaline, katerih lega je sovpadala z objekti, vrisanimi v franciscejskem katastru (Črešnar in Butina, 2009).

V letih 2014 in 2015 je bila znotraj celotnega registriranega arheološkega območja Krška vas – arheološko najdišče Zasavje (EŠD 10782) izvedena raziskava s strojnimi testnimi jarki, s katerimi so skušali natančno določiti lego in vsebino arheoloških ostalin. Na podlagi odkritih drobnih najdb in struktur se je zarisalo območje velikega arheološkega potenciala (Lazar, 2015; Černe in Rižnar, 2015).

Arheološka izkopavanja v letu 2015

Arheološka izkopavanja na območju predvidene gradnje nadvišanja za umik divjadi za HE Brežice, na parc. št. 1823/1, 1823/2, 1840/1, 4795/27, 4795/28, vse k. o. Krška vas, so podala skromne dokaze o antropogeni uporabi prostora v preteklosti.

Poleg jame SE 013/025/014 ter ruševine in ostankov temeljev manjšega objekta (SE 012, 016/017, 018, 019/020 in 023), katerega funkcije nam zaradi močne poškodovanosti ni uspelo ugotoviti, nismo odkrili drugih arheoloških struktur.

V ornici in na površini plasti SE 002 smo sicer naleteli na večjo količino novodobne lončenine, ki po eni strani kaže na prisotnost novoveške naselbine v bližini, po drugi pa je lahko posledica intenzivne obdelave in gnojenja njiv, ki so bile na tem mestu že pred več kot dvesto leti. Sama njivska razdelitev in smer oranja se nista bistveno spremenili, vsaj od časa izrisa franciscejskega katastra ne.

Med izkopavanji smo odkrili, da je bila površina na južnem delu izkopnega polja močno podvržena vodnemu delovanju (odkrita zapolnjena struga SE 004), verjetno v času tik pred nastankom objektov v neposredni bližini. V novejšem času, pri izgradnji avtoceste, so nasuli poljsko pot ter izkopal korenine dreves in grmovja, jame pa zasuli s odpadnim materialom.

Najdbe

Ob predhodnih arheoloških raziskavah na območju predvidene gradnje nadvišanja terena za umik divjadi ob avtocesti v sklopu projekta HE Brežice (Zasavje) je bilo odkritih 1595 najdb iz različnih časovnih obdobij; med njimi prevladuje lončenina s 1152 odlomki, manj je gradbenega materiala, kovine, stekla, pečnic, kosti itd. Večino gradiva sodi v zgodnjenovoveški čas, posamično pa so zastopani odlomki rimske in poznosrednjeveške keramike.

V prispevku predstavljamo zbir najbolj izpovednih najdb z znanim arheološkim kontekstom, ki jih lahko glede na primerjalno gradivo iz zanesljivo stratigrafsko datiranih sočasnih najdišč s slovenskega in srednjeevropskega prostora ožje tipološko kronološko opredelimo. Vse najdbe začasno hrani ZVKDS, CPA.

Predstavljeno keramično gradivo zajema boljše ohranjene in karakteristične kose, kot so ustja, okrašena ostenja ter skoraj v celoti ohranjene posode. Kot najstarejša smo prepoznali dva manjša odlomka ostenj rimskodobnih posod, pri katerih pa o natančnejši tipološki in časovni opredelitvi ni mogoče govoriti.

V največjem številu sta zastopani poznosrednjeveška in zgodnjenovoveška lončenina, ki ju lahko glede na primerjave z gradivom s sočasnih najdišč v Sloveniji okvirno umeštimo v čas med koncem 15. in začetkom 17. stoletja. Izdelani sta iz drobno in v manjši meri finoiznatih lončarskih mas s

primesmi sljude, kremenca in kalcijevega karbonata v različnih kombinacijah. Žgani sta bili oksidacijsko in redukcijsko. Barva posodja, izdelanega na hitrem lončarskem vretenu z obvrtenjem, je v rožnatih, rjavih in sivih odtenkih. Večina loncev je bila izpostavljena ognju, kar kažejo sledovi ožganosti na zunanji površini. Posamezne zgodnjenevoveške posode so bodisi na zunanji ali obeh površinah prekrile z zelenim ali rumeno rjavim loščem.

Med keramičnim gradivom izrazito prevladuje groba kuhinjska lončenina z obliko lonca s preprostim okrasom vezanih horizontalnih linij oziroma kanelur (kat. št. 13, 25, 27) in apliciranega razčlenjenega plastičnega rebra (kat. št. 52), manj je okrašenega oziroma neokrašenega namiznega posodja. V precejšnjem številu so zastopana ustja loncev. Navzven izvihana ustja so po obliki bodisi enostavno zaobljena (kat. št. 1, 11, 25, 42), oglata (kat. št. 2, 8, 37–39), močno odebeljena z različno (ravno, poševno, konveksno, konkavno) oblikovanim robom ustja (kat. št. 10, 13, 17, 21, 22–24, 27, 40, 45), stanjšana (kat. št. 12, 47), široko karnisna (kat. št. 3, 6, 44) in večkrat profilirana (kat. št. 26, 43, 48). Nekatera imajo vdolbino oziroma nosilec za pokrov. Sodeč po tehnologiji izdelave (obvrtenost) in visoki trdoti keramike, so mlajšega nastanka. Primerjave zanje najdemo predvsem med poznosrednjeveškim in zgodnjenevoveškim gradivom z najdišč, kot so Leskovec 2 pri Celju, Polhov Gradec, Trdnjava Kostanjevica, Šentvid pri Stični, Smladnik ipd. (Čeh, 2015: 154–157; Železnikar, 2002: 357–371; Predovnik, 2003: 198–215; Štular, 2013: 171–172; Porenta et al., 2015: 388–395). Podobna zgodnjenevoveška lončenina je bila poleg že zgoraj omenjenih najdišč odkrita tudi ob arheoloških raziskavah na območju predvidene gradnje visokovodno energetskega nasipa s tesnilno napravo HE Brežice v letih 2015 in 2016 (Lazar, Rižnar, 2015: pril. 8 in 20; Černe et al., 2016, 29: pril. 7).

Od namiznega posodja so se ohranili deli loščenih skled (kat. št. 16, 49, 50) in skodelice (kat. št. 51). Ohranjeno ustje sklede s kat. št. 49 je engobirano (prevlečeno z belim glinenim premazom), na zunanji površini okrašeno s slikanjem v zeleni barvi in prevlečeno s prosojnim svinčevim loščem. Gre za t. i. poslikano engobirano keramiko, ki se je uporabljala na območju današnje severne Italije v času od 12. do 14. stoletja, ko jo je zamenjalo posodje, premazano s kositrovim loščem, kar je bila vodilna tehnika okraševanja namiznega posodja. Ponovni vzpon cenene engobirane keramike, ki posnema dražjo majoliko, opazamo od 16. stoletja dalje (Mileusnić, 201: 37–46). Analogije omenjeni skledi s t. i. monohromnim slikanim okrasom, ki je bila domnevno namenjena za serviranje in uživanje hrane, najdemo med piranskim gradivom, datiranim v čas 16. in 17. stoletja (Cunja, 2004: 97), ter v renesančnem zbiru keramičnih najdb iz Osapske jame v slovenski Istri (Cunja, 2000: 71, t. III: 8).

Poleg lončenine sta bila odkrita tudi del reliefne plošče pečnice z rastlinskim motivom in zgornji del steklenice z ovalno ali hruškasto oblikovanim trupom. Gre za pihano steklenico iz zelenkastega stekla s cilindričnim vratom in

rahlo navzven zavihanim ustjem, ki je bila verjetno namenjena za hranjenje tekočine. Glede na podobne steklenice iz Spodnje Avstrije jo lahko umestimo v čas 16. oziroma 17. stoletja (Tarcasy, 2008: R–G 101–102, 138).

Poselitvi obravnavanega območja je na podlagi najdb mogoče slediti že od rimskega obdobja dalje. Bolj intenzivni sta bili poselitve in izraba prostora v zgodnjem novem veku, za časa obstoja vasi Zasavje, ki so jo večkratne katastrofalne poplave reke Save na krškem mestnem območju in v okolici, izpričane od leta 1628 dalje, večkrat hudo prizadele (Šebek, 2009: 99; Škofljanec, 2001: 205). V polnilih jame SE 014 je bilo odkrito večje število kovinskih, železnih predmetov, večinoma žebličkov. Poleg žebličkov (kat. št. 29–32) sta bila v jami odkrita tudi dva železna predmeta podkvaste oblike, ki predstavljata okove čevljev (kat. št. 28, 33). Očitno je, da je bil v jamo odvržen par čevljev. Organski material (usnje), iz katerega so bili čevlji verjetno izdelani, je preperel in propadel, ostali so le kovinski deli. Kovinsko gradivo lahko datiramo v isti čas kot drug material iz jame. Nekaj kovinskih najdb je bilo odkritih tudi v ruševini SE 012 (kat. št. 35, 36), ki je verjetno del lesene konstrukcije porušenega objekta. Zanimiv je tudi bronast jeziček spona (kat. št. 5), ki je bil odkrit v plasti SE 008, njegova datacija in točna funkcija pa nista določljivi.

Katalog

(SE – stratigrafska enota, kv. – kvadrant, rek. pr. u. – rekonstruiran premer ustja, ohr. v. – ohranjena višina, d. – dolžina, š. – širina, ohr. v. – ohranjena velikost)

1 SE 008, kv. D 24

Ustje in ostenje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta blede rjave barve (10 YR 7/4). Sledovi ognja na robu ustja – enakomerna potemnitev črnosive barve (10 YR 3/1). Rek. pr. u. 9,4 cm; ohr. v. do 2,9 cm.

2 SE 008, kv. D 22

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Notranja in zunanja površina sta zelo temno sive barve (10 YR 3/1). Rek. pr. u. 9 cm; ohr. v. do 2,6 cm.

3 SE 008, kv. C 21

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Notranja in zunanja površina sta zelo temno sive barve (10 YR 3/1). Rek. pr. u. 14 cm; ohr. v. do 2,6 cm.

4 SE 008, kv. /

Dno posode. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Notranja in zunanja površina sta temno sive barve (10 YR 4/1). Rek. pr. u. 8,6 cm, ohr. v. do 1,6 cm.

5 SE 008, kv. B 24

Bronast jeziček. D. 2,2 cm, š. 0,5 cm.

6 SE 006, kv. A 15

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta svetlo sive barve (5Y 7/1). Sledovi ognja na zunanji površini – lise zelo temno sive barve (10 YR 3/1). Rek. pr. u. 16 cm, ohr. v. do 2,1 cm.

7 SE 006, kv. D 24

Trakast ročaj. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta rožnate barve (7,5 YR 8/4). Ohr. vel. 2,2 v 4 cm.

8 SE 005, kv. C 23

Ustje in ostenje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja površina je blede rjave barve (10 YR 7/3), zunanja površina je svetlo rjavosive barve (10 YR 6/2). Sledovi ognja na zunanji površini – lise zelo temno sive barve (10 YR 3/1). Notranja in delno zunanja površina sta prevlečeni z olivno zelenim loščem. Rek. pr. u. 12,8 cm, ohr. v. do 5,1 cm.

9 SE 005, kv. C 19

Ustje posode. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta rožnate barve (7,5 YR 8/4). Sledovi ognja na zunanji površini – lise črno sive barve (10 YR 3/1). Rek. pr. u. 17,6 cm, ohr. v. do 2 cm.

10 SE 002, kv. D 15

Ustje in ostenje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta rožnate barve (7,5 YR 7/4). Sledovi ognja na zunanji površini roba ustja – lise sive barve (10 YR 5/1). Rek. pr. u. 20 cm, ohr. v. do 4,8 cm.

11 SE 002, kv. D 15

Ustje in ostenje lonca. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Notranja površina je rjave barve (7,5 YR 5/3), zunanja površina je temno sive barve (10 YR 4/1). Sledovi ognja na zunanji in notranji površini – lise zelo temno sive barve (10 YR 3/1). Rek. pr. u. 13,6 cm, ohr. v. 3,6 cm.

12 SE 002, kv. B 12

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Zunanja in notranja površina sta zelo blede rjave barve (10 YR 7/3), prevlečeni sta s temno zelenim loščem. Rek. pr. u. 16 cm, ohr. v. do 1,9 cm.

13 SE 002, kv. D 12

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Redukcijska atmosfera. Zunanja in notranja površina sta temno sive barve (7,5 YR 4/1). Rek. pr. u. 17,8 cm, ohr. v. do 2,2 cm.

14 SE 002, kv. D 15

Ustje in ostenje lončka. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Zunanja in notranja površina sta temno sivkasto rjave barve (10 YR 4/2). Sledovi ognja na zunanji in notranji površini – lise zelo temno sive barve (10 YR 3/1). Rek. pr. u. 12 cm, ohr. v. do 2,3 cm.

15 SE 002, kv. C 20

Ustje in ostenje sklede. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Zunanja in notranja površina sta temno sive barve (10 YR 4/1). Sledovi ognja na notranji površini – lise zelo temno sive barve (10 YR 3/1). Rek. pr. u. 20 cm, ohr. v. do 5,2 cm.

16 SE 002, kv. B 12

Ustje sklede. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje, v končni fazi oksidacijska atmosfera. Zunanja in notranja površina sta rožnate barve (7,5 YR 7/4). Notranja površina je prevlečena s svetlo rumenorjavim loščem. Rek. pr. u. 28,4 cm, ohr. v. do 2,2 cm.

17 SE 002, kv. D 13, 14

Ustje posode. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Zunanja in notranja površina sta zelo temno sive barve (2,5 Y 3/1). Ohr. vel. 2,4 x 2,2 cm.

18 SE 002, kv. B 18

Ustje in ostenje sklede. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Zunanja in notranja površina sta svetlo rjave barve (7,5 YR 6/4). Ohr. vel. 3,2 x 2,8 cm.

19 SE 002, kv. B 18

Ročaj posode. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Zunanja in notranja površina sta svetlo rdečerumene barve (5 YR 6/6). Sledovi ognja na notranji površini – lise zelo temno sive barve (10 YR 3/1). Ohr. vel. 3,8 x 2,2 cm.

20 SE 002, kv. D 12

Železen žebelj. D. 6,3 cm, š. 1,1 cm.

21 SE 013 = 025, kv. D 14

Lonec. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta blede rjave barve (10 YR 6/3). Sledovi ognja na zunanji površini – lise črno sive barve (10 YR 3/1). Rek. pr. u. 20 cm, ohr. v. do 22 cm.

22 SE 013 = 025, kv. D 14

Ustje in ostenje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta zelo blede rjave barve (10 YR 7/4). Rek. pr. u. 16 cm, ohr. v. do 6,8 cm.

23 SE 013 = 025, kv. D 14

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta zelo bledo rjave barve (10 YR 7/4). Lise sive barve (10 YR 5/1). Rek. pr. u. 19,8 cm, ohr. v. do 1,8 cm.

24 SE 013 = 025, kv. D 14

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta svetlo rjave barve (7,5 YR 6/4). Rek. pr. u. 24 cm, ohr. v. do 2,7 cm.

25 SE 013 = 025, kv. D 14

Ustje in ostenje lonca. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Notranja površina je rjave barve (7,5 YR 5/3), zunanja površina je zelo temno sive barve (GLEY 3/). Horizontalna kanelura na zunanji površini ramen. Sledovi ognja na zunanji površini – lise zelo temno sive barve (10 YR 3/1). Rek. pr. u. 13,6 cm, ohr. v. do 7,8 cm.

26 SE 013 = 025, kv. D 14

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta rdečrumene barve (7,5 YR 7/6). Rek. pr. u. 18,6 cm, ohr. v. do 2,8 cm.

27 SE 013 = 025, kv. D 14

Ustje in ostenje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta zelo bledo rjave barve (10 YR 7/3). Sledovi ognja na zunanji površini – lise zelo temno sive barve (10 YR 3/1). Pr. u. 18 cm, ohr. v. do 4,4 cm.

28 SE 013 = 025, kv. D 14

Železen okov čevlja. D. 6,5 cm, š. 6 cm.

29 SE 013 = 025, kv. D 14

Železen žebliček. D. 2 cm, š. 1,1 cm.

30 SE 013 = 025, kv. D 14

Železen žebliček. D. 1,8 cm, š. 1 cm.

31 SE 013 = 025, kv. D 14

Železen žebliček. D. 1,7 cm, š. 0,9 cm.

32 SE 013 = 025, kv. D 14

Železen žebliček. D. 1,8 cm, š. 1,1 cm.

33 SE 013 = 025, kv. D 14

Železen okov čevlja. D. 6,5 cm, š. 6 cm.

34 SE 012, kv. D 12

Železen predmet, verjetno žebelj. D. 3,5 cm, š. 1 cm.

35 SE 012, kv. D 12

Železna ploščica. D. 4,5 cm, š. 1 cm.

36 SE 012, kv. D 12

Železen žebelj. D. 4 cm, š. 1,4 cm.

37 SE 001 kv. /

Ustje in ostenje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Zunanja in notranja površina sta zelo bledo rjave barve (10 YR 7/3). Sledovi ognja na notranji strani ustja – lise temno sive barve (10 YR 3/1). Rek. pr. u. 22,4 cm, ohr. v. 4,1 cm.

38 SE 001, kv. D 10

Ustje in ostenje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Zunanja in notranja površina sta zelo bledo rjave barve (10 YR 7/3). Sledovi ognja na notranji strani ustja in zunanji površini – lise zelo temno sive barve (10 YR 3/1). Rek. pr. u. 16 cm, ohr. v. do 2,9 cm.

39 SE 001, kv. C 13

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Notranja in zunanja površina sta zelo temno sive barve (2,5 Y 3/1). Rek. pr. u. 16,8 cm, ohr. v. do 2 cm.

40 SE 001, kv. D 16

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina je zelo bledo rjave barve (10 YR 7/3). Sledovi ognja na zunanji površini – lise zelo temno sive barve (10 YR 3/1). Rek. pr. u. 20 cm, ohr. v. 1,9 cm.

41 SE 001, kv. C 13

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Ne-popolno oksidacijsko žganje, v končni fazi dimljenje. Notranja in zunanja površina sta rožnate barve (7,5 YR 7/4). Sledovi ognja na zunanji in notranji površini – lise zelo temno sive barve (10 YR 3/1). Rek. pr. u. 20,8 cm, ohr. v. do 2 cm.

42 SE 001, kv. B 23

Ustje posode. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta rdeče rumene barve (7,5 YR 7/6). Rek. pr. u. 13,6 cm, ohr. v. do 1,7 cm.

43 SE 001, kv. B 19

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Notranja in zunanja površina sta sive barve (10 YR 5/1). Rek. pr. u. 18 cm, ohr. v. do 2 cm.

44 SE 001, kv. D 3

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Notranja in zunanja površina sta sive barve (10 YR 5/1). Rek. pr. u. 13,2 cm, ohr. v. do 2 cm.

45 SE 001, kv. D 16

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta zelo bledo rjave barve (10 YR 7/3). Ohr. vel. 2,5 x 2,4 cm. Rek. pr. ustja 20,1 cm.

46 SE 001, kv. D 1–D 26

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Notranja in zunanja površina sta sivkastorjave barve (10 YR 5/2). Rek. pr. u. 17,6 cm, ohr. v. do 2,5 cm.

47 SE 001, kv. D 1–D 26

Ustje lončka. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta zelo bledo rjave barve (10 YR 7/3). Sledovi ognja na zunanji površini – lise zelo temno sive barve (10 YR 3/1). Notranja površina in zunanji rob ustja prevlečena s temno zelenim loščem (na zunanjem robu tudi sledovi rjavega lošča). Rek. pr. u. 20 cm, ohr. v. do 2,2 cm.

48 SE 001, kv. C 6, D 6

Ustje lonca. Izdelava iz drobnozrnate lončarske mase. Redukcijsko žganje. Zunanja in notranja površina sta zelo temno sivi (GLEY 3/). Rek. pr. u. 11,6 cm, ohr. v. do 2,3 cm.

49 SE 001, kv. C 5, D 5

Ustje skleda. Izdelava iz finoizrinate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina, rdečrumene barve (7,5 YR 7/6), sta engobirani in prevlečeni z loščem. Na zunanjem robu ustja sledovi slikanja z zeleno barvo (10 YR 8/2) na engobo pod loščem. Rek. pr. u. 22 cm, ohr. v. do 2,6 cm.

50 SE 001, kv. D 13

Ustje skleda. Izdelava iz finoizrinate lončarske mase. Oksidacijsko žganje. Notranja in zunanja površina sta rožnate barve (7,5 YR 7/4). Notranja površina je premazana s finim premazom rdeče barve (2,5 YR 4/6). Rek. pr. u. 15,2 cm, ohr. v. do 1,8 cm.

51 SE 001, kv. D 1–D 26

Ustje skodelice. Izdelava iz finoizrinate lončarske mase. Oksidacijsko žganje. Notranja površina je rožnate barve (7,5 YR 7/4). Zunanja površina je prevlečena z rjavim loščem. Rek. pr. u. 6 cm, ohr. v. do 1,8 cm.

52 SE 001, kv. D 14

Ostenje posode. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Zunanja in notranja površina sta zelo bledo rjave barve (10 YR 8/3). Zunanja površina je okrašena z apliciranim rebrom z odtisi prstov. Rek. pr. u. 3,2 x 2,2 cm.

53 SE 001, kv. D 13

Dno posode. Izdelava iz finoizrinate lončarske mase. Oksidacijsko žganje. Zunanja in notranja površina sta zelo bledo rjave barve (10 YR 8/3). Na zunanji površini so ostanki glinenega premaza temno rjave barve (10 YR 3/1). Rek. pr. dna. 3,6 cm, ohr. v. do 1,8 cm.

54 SE 001, kv. C 26

Odlomek pečnice. Izdelava iz drobnozrnate lončarske mase. Oksidacijsko žganje. Zunanja in notranja površina sta zelo bledo rjave barve (10 YR 7/3). Zunanja površina je okrašena z rastlinskim motivom. Ohr. vel. 5,1 x 5 cm.

55 SE 001, kv. D 11

Ustje, vrat in ostenje steklenice. Steklenica je bila izdelana s pihanjem iz prozornega stekla zelenega odtenka. Na zunanji površini biserovinast iris. Rek. pr. u. 3 cm, ohr. v. do 4,2 cm.

Sklep

Zaradi vodnega delovanja, globokega oranja in mlajših gradbenih posegov je bilo območje raziskave v bližnji preteklosti močno preoblikovano. Med izkopavanji smo odkrili dve arheološki strukturi (jamo in temelje manjšega objekta). Obe strukturi sta bili odkriti na skrajnem severovzhodnem robu izkopnega polja, zato predvidevamo, da je bil večji del najdišča že predhodno uničen zaradi močnega vodnega delovanja, ki smo ga identificirali tudi v strugi rečnega kanala, odkriti na južnem delu najdišča. Jamo in objekt, ki mu pripadajo odkriti temelji, lahko na podlagi drobnega gradiva datiramo v čas med koncem 15. in začetkom 17. stoletja. Točne funkcije obeh struktur nam niso poznane, verjetno pa so del nekih dejavnosti, ki so se izvajale na obrobju samostojne kmetije, ki je stala severno od našega izkopnega polja. V naplavinskih plasteh smo odkrili tudi nekaj drobnega gradiva, ki ga lahko datiramo v rimsko dobo, kar kaže na to, da lahko na širšem območju pogojno pričakujemo tudi ostanke rimskodobne poselitve. Kljub maloštevilnim najdbam in odkritim arheološkim strukturam najdišče dopolnjuje arheološko sliko poselitve širšega območja novoveške vasi Zasavje, poleg tega pa nam daje vpogled v spreminjanje krajine Spodnjavske doline in vpliv delovanja reke Save na naselitvene vzorce in izrabo prostora skozi čas.

Povzetek

Zavod za varstvo kulturne dediščine, Center za preventivno arheologijo, je izvedel arheološka izkopavanja na območju predvidene gradnje nadvišanja za umik divjadi za HE Brežice. Obravnavano območje leži znotraj območja, ki je v registru nepremične kulturne dediščine vpisano kot Krška vas – arheološko najdišče Zasavje (EŠD 10782). Raziskave so bile omejene na območje bodočega nasipa, ki zajema prostor, velik približno 128 x 20 m. Na tem območju smo izkopali in dokumentirali površino velikosti pribl. 2130 m². Strojni izkop je segal od 0,30 do 1,50 m globoko.

Arheološke raziskave so bile izvedene pod vodstvom Mihe Murka, univ. dipl. arheologa, julija in avgusta 2015. Obravnavano območje leži neposredno ob avtocesti Ljubljana–Obrežje in približno 600 m severno od Krške vasi. Tukaj naj bi vas Zasavje stala do leta 1781, ko so jo uničujoče poplave v celoti razdejale oziroma odplavile. Po teh poplavah so vas le deloma obnovili in naselili, na začetku 20. stoletja pa so jo dokončno zapustili.

Geološko podlago raziskanega območja predstavlja peščen prod mešane, pretežno karbonatne sestave, ki je savska naplavina. Območje leži na najmlajši savski terasi, ki je nastala v holocenu z vrezovanjem oziroma erozijo v lasten pleistocenski zasip (Rižnar, 2015). Morfologija površine kaže na večje število opuščenih kanalov oziroma rokavov, ki jih je za sabo pustila reka Sava.

Pred prvimi večjimi arheološkimi raziskavami tega prostora je bila tukaj zgrajena tudi avtocesta. Z arheološkimi raziskavami v letih od 2007 do 2009 so arheologi odkrili in locirali ostaline, ki jih lahko povežemo z vasjo. V tem času je bil tukaj, v sklopu arheoloških raziskav ob gradnji HE Brežice, izveden ekstenziven arheološki pregled, ki je pokazal na možnost obstoja novoveškega arheološkega najdišča ob desnem bregu reke Save (Mlekuž, Pergar, 2009: 12). Zaradi tega je bil izveden tudi intenzivni arheološki pregled, ki je potrdil rezultate ekstenzivnega in jih v veliki meri tudi dopolnil. Tako so raziskovalci poleg novoveškega drobnega materiala odkrili tudi ostanke stoječih struktur oziroma ruševin hiš (Mlekuž, Pergar, 2009: 18).

Arheološka izkopavanja na območju predvidene gradnje nadvišanja za umik divjadi za HE Brežice so podala skromne dokaze o antropogeni uporabi prostora v preteklosti. Odkriti so bili novoveška jama ter ruševina in ostanke temeljev manjšega objekta, katerega funkcije zaradi močne poškodovanosti nismo mogli ugotoviti. Med izkopavanji nismo odkrili nobenih drugih intaktnih arheoloških ostalin. V ornici in na površini plasti pod njo smo sicer našli na večjo količino lončenine, datirane v čas med koncem 15. in začetkom 17. stoletja, ki po eni strani kaže na prisotnost zgodnjenovoveške naselbine v bližini, po drugi pa je lahko posledica intenzivne obdelave in gnojenja njiv, ki so bile na tem mestu že pred več kot dvesto leti. Sama njivska razdelitev in smer oranja se nista bistveno spremenili, vsaj od

časa izrisa franciscejskega katastra. Med izkopavanji smo odkrili, da je bila površina na južnem delu izkopnega polja močno podvržena vodnemu delovanju, verjetno v času tik pred nastankom objektov v neposredni bližini. V novejšem času, pri izgradnji avtoceste, so nasuli poljsko pot ter izkopali korenine dreves in grmovja, jame pa zasuli z odpadnim materialom.

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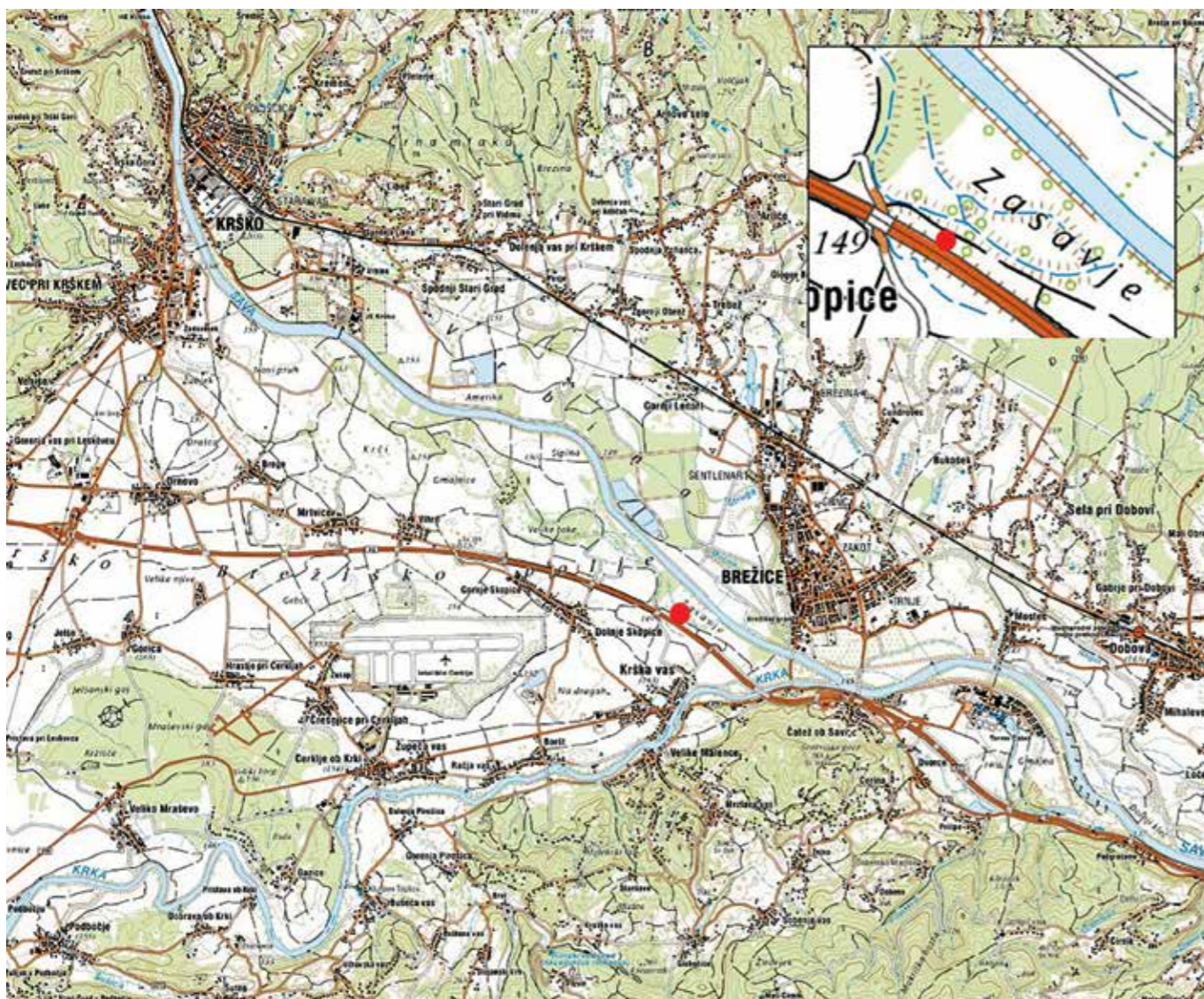
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1. Pogled na območje raziskave pred začetkom del (foto: M. Murko)

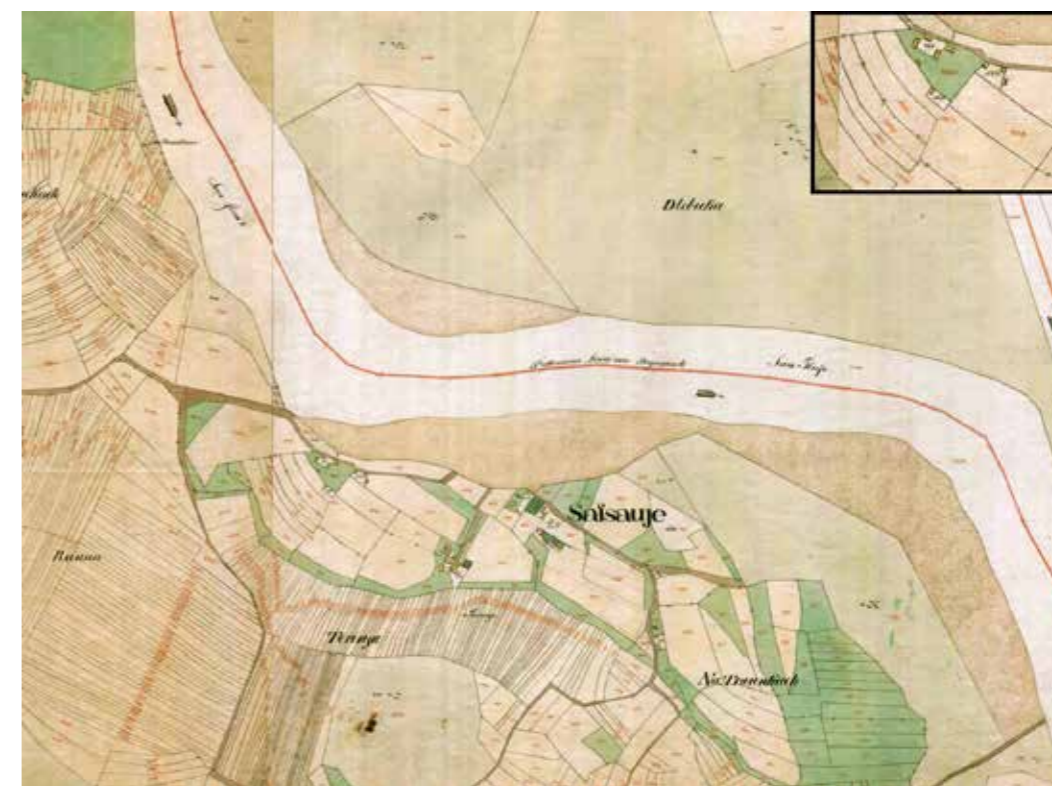
1. View of the research area before the start of works (photo: M. Murko)



2. Lokacija obravnavanega območja (vir: <http://www.geopedia.si>)
 2. Location of the area under consideration (source: <http://www.geopedia.si>)



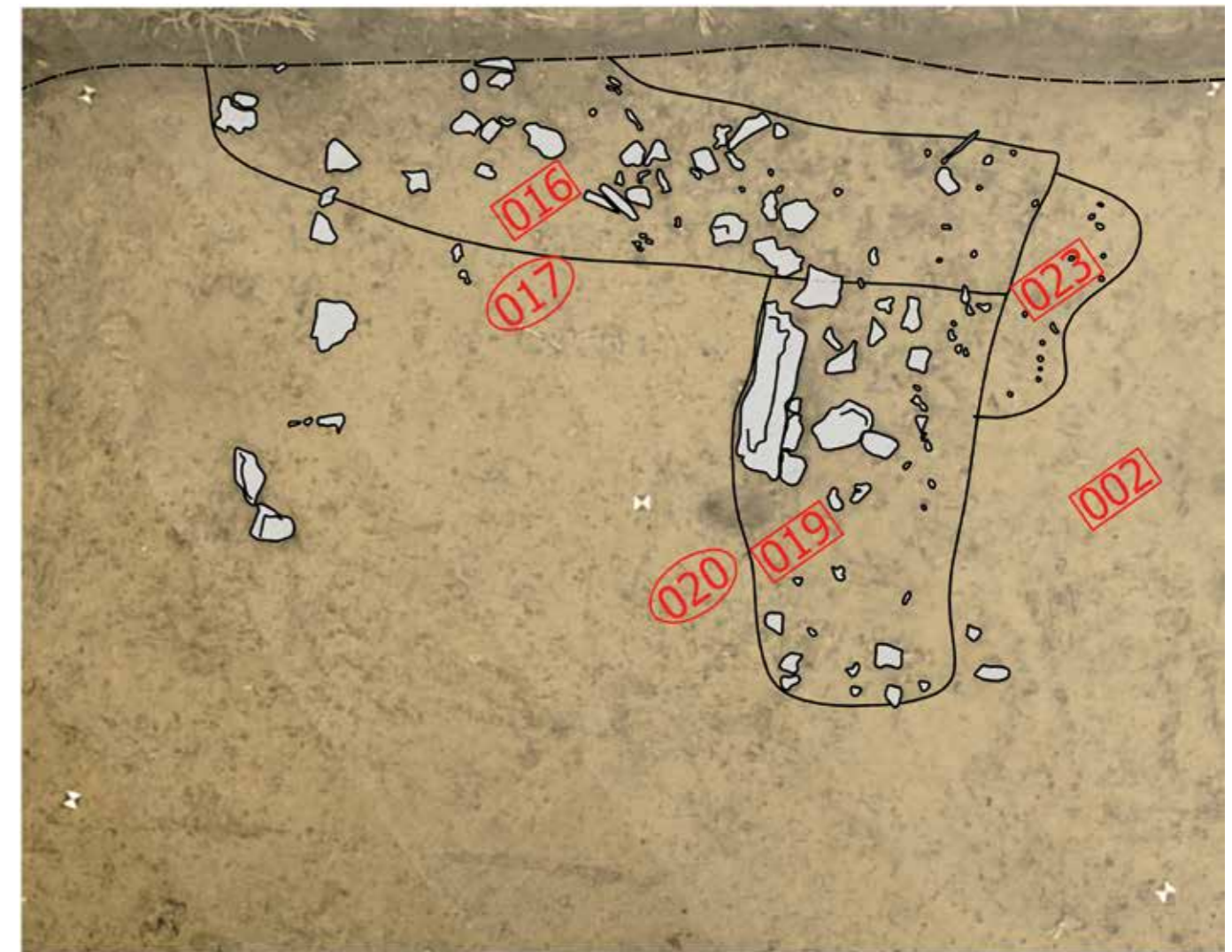
3. Zasavje na vojaškem zemljevidu 1763–1787 (Slovenija na vojaškem zemljevidu 1763–1787 – karte – 2. zvezek, sekcija 220, Ljubljana, 1996)
 3. Zasavje on the military map created between 1763 and 1787 (Slovenija na vojaškem zemljevidu 1763–1787 – Maps – Vol. 2, Section 220, Ljubljana, 1996)



4. Zasavje v franciscejskem katastru iz leta 1824 (splet 4)
 4. Zasavje in the Franciscan cadastral survey of 1824 (set 4)



5. Pogled na izkopno polje na nivoju plasti SE 003 in 007 (foto: I. Vrenčur)
 5. View of the excavation field at the level of layers SU 003 and 007 (photo: I. Vrenčur)



7. Interpretirana fotoskica z izrisom ostankov temeljev objekta SE 016 in 019 (foto: I. Vrenčur; izris: N. Žitko)
 7. Interpreted photosketch with remains of foundations of structures SU 016 and 019 (photo: I. Vrenčur; drawing: N. Žitko)



6. Jama SE 014 po odstranitvi prvega polnila SE 013 (foto: I. Vrenčur; izris: N. Žitko)
 6. Pit SU 014 after removal of first fill SU 013 (photo: I. Vrenčur; drawing: N. Žitko)



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10. Ustje lonca iz plasti SE 008 (foto: M. Arh; obdelava: M. Murko)
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 11. *Pot rim from layer SU 006 (photo: M. Arh; processing: M. Murko)*



12. Trakast ročaj iz plasti SE 006 (foto: M. Arh; obdelava: M. Murko)
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14. Rekonstrukcija lonca iz jame SE 025 (foto: M. Arh; obdelava: M. Murko)
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15. Železen okov čevlja iz polnila jame SE 013 (foto: M. Pečovnik; obdelava: M. Murko)
 15. Iron shoe fastening from fill of pit SU 013 (photo: M. Pečovnik; processing: M. Murko)



18. Železen okov čevlja iz polnila jame SE 013 (foto: M. Pečovnik; obdelava: M. Murko)
 18. Iron shoe fastening from fill of pit SU 013 (photo: M. Pečovnik; processing: M. Murko)



20. Odlomek pečnice iz plasti SE 001 (foto: M. Arh; obdelava: M. Murko)
 20. Stove tile fragment from layer SU 001 (photo: M. Arh; processing: M. Murko)



16. Železen žbljiček iz polnila jame SE 013 (foto: M. Arh; obdelava: M. Murko)
 16. Iron nail from fill of pit SU 013 (photo: M. Arh; processing: M. Murko)



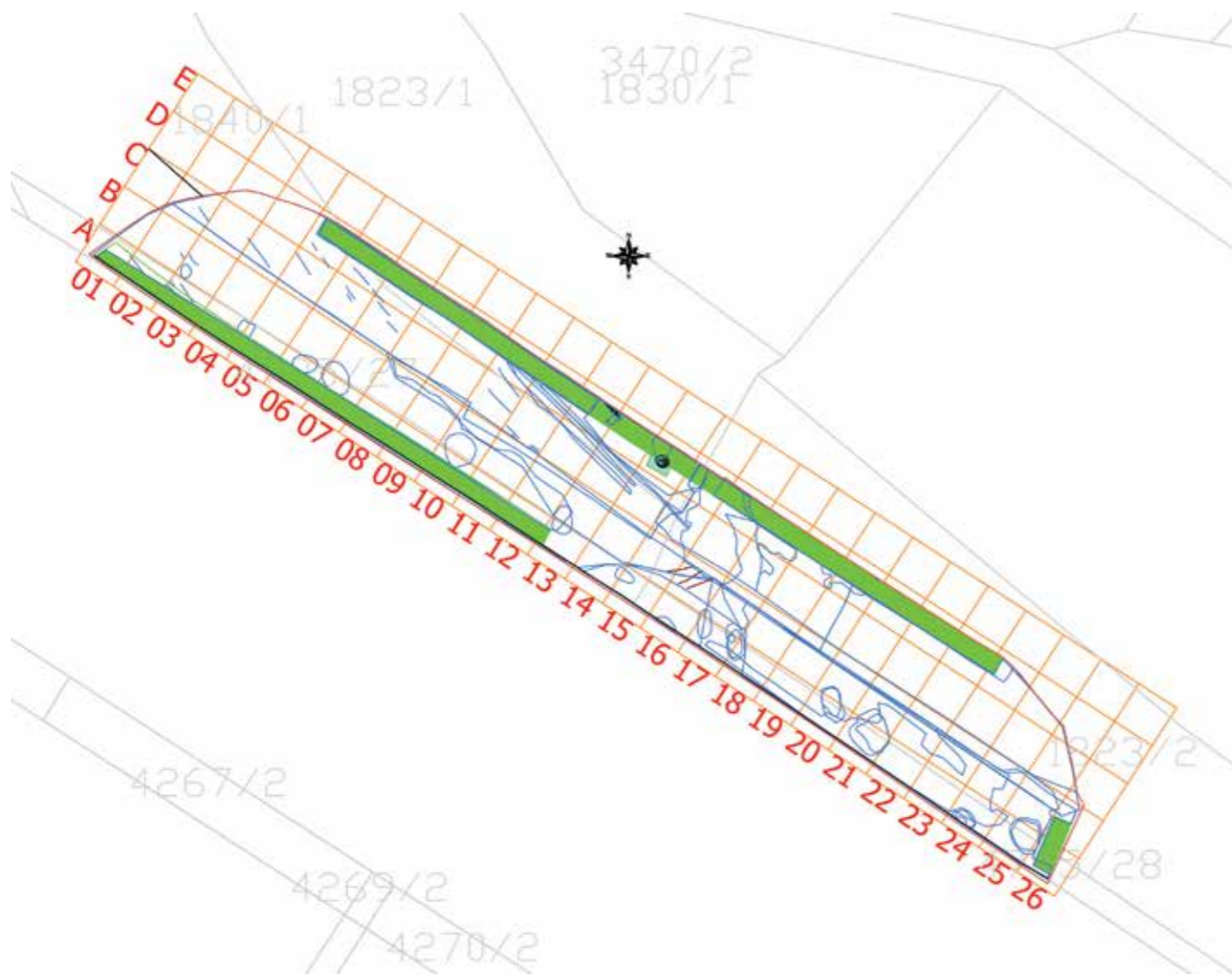
17. Železen žbljiček iz polnila jame SE 013 (foto: M. Arh; obdelava: M. Murko)
 17. Iron nail from fill of pit SU 013 (photo: M. Arh; processing: M. Murko)



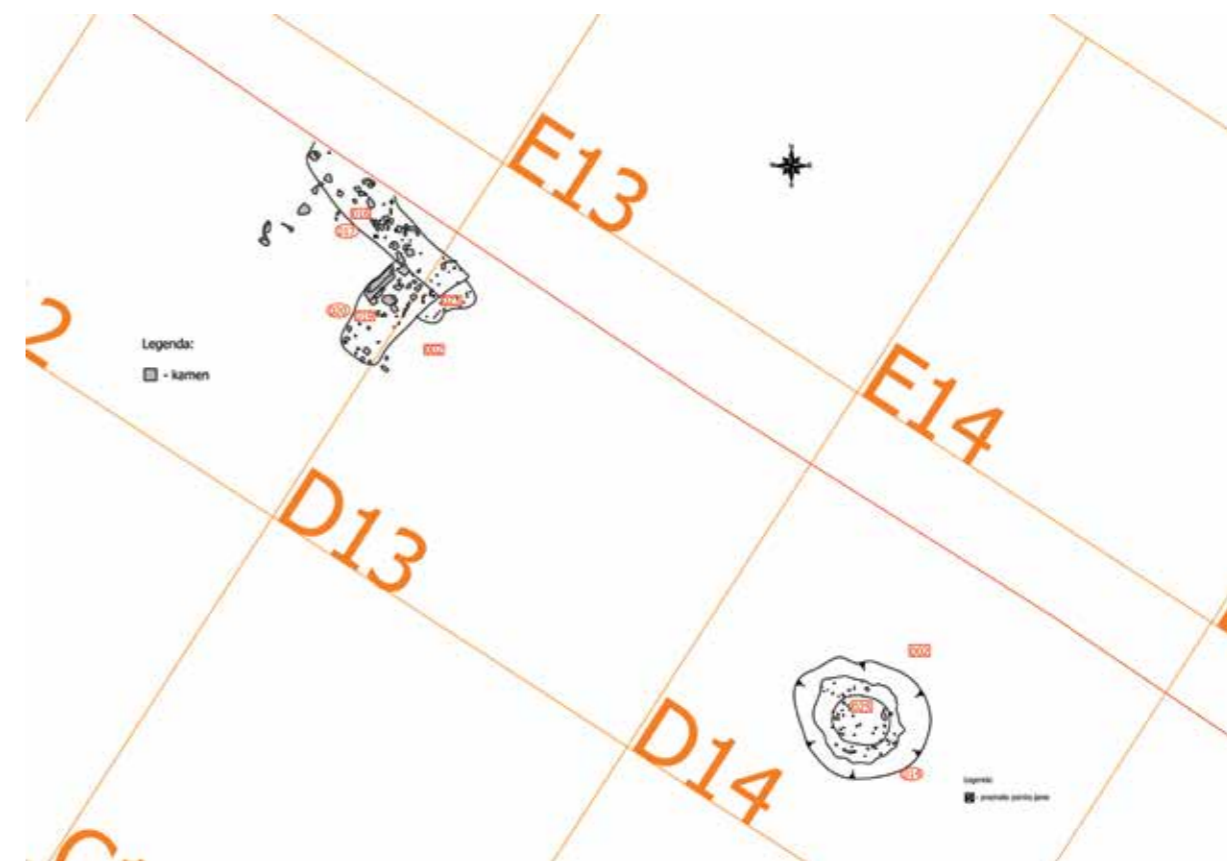
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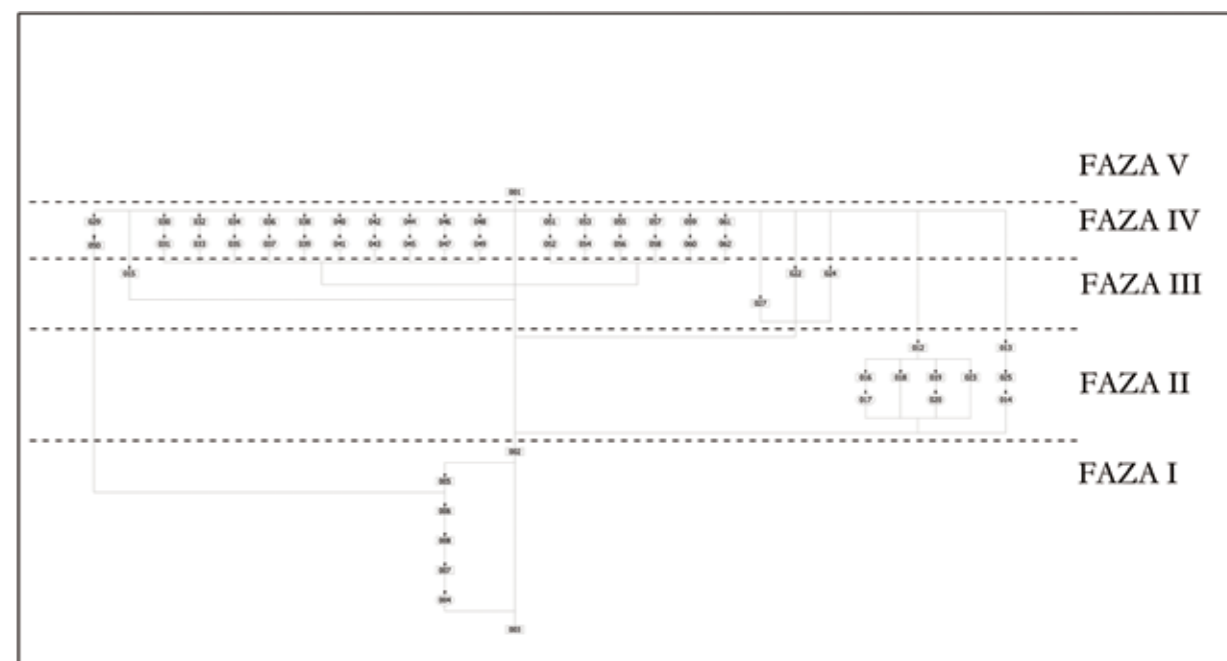
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Miha Murko

Archaeological excavations in the area of the planned wildlife escape structure at the Brežice hydropower plant

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Abstract

In the summer of 2015, the Centre for Preventive Archaeology of the Institute for the Protection of Cultural Heritage of Slovenia carried out archaeological excavations in the area of a planned wildlife escape structure at the Brežice hydropower plant. Modest evidence of past human activity in the area was unearthed during the dig. Besides a large quantity of pottery and other small artefacts, for the most part discovered in arable land, we uncovered a large waste pit and the foundations of a small structure; both were in use in the early modern era, at a time when the village of Zasavje extended across the wider area.

Introduction

The Centre for Preventive Archaeology (CPA) of the Institute for the Protection of Cultural Heritage of Slovenia (ZVKDS) carried out archaeological excavations in the area of the planned wildlife escape structure at the Brežice hydropower plant (Brežice HPP) on the basis of a cultural protection approval for the research and removal of archaeological remains (No. 62240-146/2015/3 of 9 June 2015) in parcel numbers 1823/1, 1823/2, 1840/1, 4795/27, 4795/28, all within the Krška Vas cadastral district. The parcels in question lie within an area that is entered in the Register of Immovable Cultural Heritage as “Krška Vas – Zasavje

archaeological site (EŠD 10782)”. Research was limited to the area of the future embankment, which covers an area measuring approximately 128 x 20 m. Within this area we excavated and documented an area measuring approximately 2,130 m². Mechanical excavation went from a depth of 0.30 m to 1.50 m (approximately 2000 m³ of earth was removed mechanically).

The archaeological research was carried out under the leadership of archaeologist Miha Murko in July and August 2015. The research archive and documentation are in the temporary keeping of the CPA at the ZVKDS.

The area under consideration lies directly next to the Ljubljana–Obrežje motorway section and is approximately 600 m north of Krška Vas. It is bounded to the SW by the present motorway and to the NE by the channel of the river Sava.

The geological substrate of the surveyed area consists of sandy gravel of predominantly carbonate composition, which is alluvium of the Sava. The area lies on the youngest Sava terrace, formed in the Holocene by cutting or eroding into its own Pleistocene fill (Rižnar, 2015). The morphology of the surface indicates a large number of abandoned channels or backwaters left behind by the Sava. Historical maps show that the course of the Sava varied considerably in the eighteenth and nineteenth centuries and that the river frequently changed course, in doing so also changing its channel or bed. This ultimately changed in the second half of the

nineteenth century and the first half of the twentieth, when the course of the river was regulated, in this way entirely changing the appearance of the surrounding landscape, including the research area (Mlekuž, Pergar, 2009: 5).

History of the area and of research

The research area lies within a protected archaeological site entered in the Register of Immovable Cultural Heritage as “Krška Vas – Zasavje archaeological site (EŠD 10782)”. The village of Zasavje is believed to have stood here until 1781, when it was completely destroyed or washed away by devastating floods. Following these floods, the village was only partly repaired and resettled, before being definitively abandoned in the early twentieth century.

The mutability of the channel is evident both from the morphology of the terrain and from historical maps (Černe, Veršnik and Rižnar 2016, 10). The last change to the channel occurred in the second half of the nineteenth century and the first half of the twentieth, when the course of the river was regulated, a process that thoroughly changed the surrounding landscape, including the research area (Mlekuž, Pergar, 2009: 5; Lazar, 2015: 8–9).

The first more extensive regulation works on the river Sava began in the first half of the eighteenth century, when changes occurred in the economic and military position of the Austrian Empire. The need to increase the navigability of the Sava derived above all from the need to move military units rapidly, but also related to the desire to establish better trade connections with the newly conquered territories in the Balkans. Regulation works included cleaning the banks, blasting rocks on the riverbanks and in the water, cutting through meanders and building new channels and towpaths along which men and animals towed vessels upstream. In the Vrbina area, where the area under consideration is located, regulation of the channel began in around 1775, while a system of towpaths was complete by around 1830. On the section of river between Brežice and Krško, towpaths alternated between the left and right banks of the river, depending on the water level (Gaspari and Erič, 2005: 32). With the construction of the Zidani Most–Sisak railway line in 1862, the importance of the Sava as a transport route waned, and with it the importance of the towpath (Umek, 1986).

Extensive regulation works began in the second half of the nineteenth century with the digging of a man-made channel for the Sava and the reinforcement of the riverbanks with blocks of cut limestone. The exact progress of the works is not known, but it may be seen from the 1858 geological map, which in 1908 was traced onto a new topographical unit, that the man-made channel was already dug at this

time, although water still remained in the old channels. A German map from 1943 shows that the regulation works on the Sava were complete (Verbič & Berič, 1993–1994: 333). The remains of riverbank consolidation were discovered along the right bank at Šmarčna (Gaspari & Erič, 2004: 8), Boštanj (Gaspari & Erič, 2004: 11), Log (Gaspari & Erič, 2005: 6–7; Ravnik & Predan, 2008), Blanca (Bajde, 2006) and Spodnje Gunte (Gaspari and Erič, 2005: 22; Olič, 201: 3). Several arch bridges built from precisely cut limestone blocks also survive on this section of the Sava. These bridges carried the path over the streams discharging into the Sava (Gaspari and Erič, 2005: 32).

The late medieval and early modern era village of Zasavje stood in the research area, as shown by written and cartographic sources and individual remains of more recent structures. The first mention of the village in written sources is in the land register for the year 1525, where it appears as “Dolene Sassaue” or “Spodnji Otok” (Kos, 1957: 8), with five farms, seven smallholdings and two abandoned farms (Koropec, 1976: 105). In an older land register from 1498 the place is not yet mentioned as Zasavje but as Spodnja (Lower) Vrbina (Koropec, 1976: 105). Later land registers show a fluctuating number of homesteads: in 1719 seventeen homesteads were recorded; in 1726 there were nineteen large farms, five small farms on common land (*Untersassen*) and two cottages; in 1737 there were twenty-three homesteads; in 1741 there were eighteen large farms, four small farms on common land and two cottages; in 1760 there were fourteen large farms, four small farms and two cottages; in 1771 there were twenty large farms, five small farms and two cottages; in 1783 there were nineteen large farms and five small farms. After this year, the number of homesteads began to diminish. By 1824 the number had fallen to twelve, in 1858 there were still six of them, while by 1892 only two remained. In 1901 the last two homesteads were abandoned by their inhabitants, who settled in Krška Vas (Smukovič, 2014: 746–750, Župnija Cerklje ob Krki). The reason for the gradual migration from Zasavje to other villages in the surrounding area, in particular Krška Vas, was the risk of flooding. The flood that occurred at the end of January 1781, when the Sava altered its course and created a new channel, was an important turning point. This flood carried off almost the entire village: fourteen houses and St Nicholas’s Church. This event is recorded in the conventual chronicle of the Franciscans of Brežice (*Diarium Conventus Runensis ab anno 1752 usque ad annum / 24 augusti anni 1892*), in which the chroniclers recorded everything that befell the brothers both inside and outside the friary (Škofljanec, 2001: 206). St Nicholas’s was a chapel of ease that stood by the road leading from Brežice to Skopice (Škofljanec, 2001: 207), on the site of the present-day channel of the Sava (Smukovič, 2014: 746). It had three altars, dedicated respectively to the church’s patron saint, to St George and to St Catherine, virgin and martyr (Škofljanec, 2001: 207). Following the devastating flood, the image of the saint was

carried to St Roch's Church in Brežice after a solemn Mass and the altar was deconsecrated (Škofljanec, 1996: 41). Following the abandonment of the village, this area remained as farmland and was frequently exposed to flooding. This is also confirmed by the thick deposits of river sediments that cover the entire area (Černe, Veršnik and Rižnar, 2016: 10).

Historical maps are another highly informative source about the village. The oldest cartographic appearance of the village of Zasavje is on Florjančič's 1774 map *Ducatus Carnioliae Tabula Chorographica*, which in addition to the topographical name "Safsauie" includes St Nicholas's Church on the road between Brežice and Skopice (Černe, Veršnik and Rižnar, 2016: 10).

The Josephine military map based on the first survey (1763–1787) shows other buildings in addition to the churches and castles shown on the previous map. Fourteen buildings are shown in the area of the village of Zasavje, but not St Nicholas's Church. This map, which was drawn shortly after the catastrophic flood of 1781, thus confirms the destruction of the church and, at the same time, shows the exact location of the surviving part of the village (Černe, Veršnik and Rižnar, 2016: 10).

The number of buildings on the map (14) does not correspond to the number of homesteads shown in the 1783 land register (24). The most likely explanation is that the buildings were inaccurately shown on the map. That this is indeed the case is confirmed by an 1807 map of the river Sava (Černe, Veršnik and Rižnar, 2016: 11), which includes a more accurate depiction of more than 20 buildings.

It is evident from the maps that between 1807 and 1824 (when the Franciscan cadastral survey was drawn up), the Sava had moved even further towards the south and destroyed the northernmost group of houses (Černe, Veršnik and Rižnar, 2016: 12). Only the central and western parts of the village survived. Five buildings appear for the first time to the east of the village centre. This is evident both from the Franciscan cadastral survey (Černe, Veršnik and Rižnar, 2016: 10) and from the Josephine military map based on the second survey (1829–1835) (Černe, Veršnik and Rižnar, 2016: 12).

Similar fragmentation of the village of Zasavje is apparent on a map of the section of the Sava from Krško to Brežice made in 1839 (Černe, Veršnik and Rižnar, 2016: 10), although with a smaller number of buildings in the western and central parts of the village. There is, however, an increase in the number of buildings in the eastern part, where the name Carlowetz also appears for the first time. The mass abandoning of the village in the second half of the nineteenth century is visible not only from the land register census but also on the Josephine military map based on the third survey (1869–1887), which shows just seven buildings (Černe, Veršnik and Rižnar, 2016: 13); this almost corresponds to the indication of six homesteads in the 1858 land register.

The area has also undergone archaeological surveying. The first investigations, in the form of an extensive field survey, took place in 1998 on the planned route of the present-day motorway, where medieval and early modern potsherds, construction material and ploughed up architectural remains (worked limestone) of the abandoned buildings in the former village were uncovered (Pinter, 1998: 11).

In 2008 analysis was carried out of LiDAR images of the floodplain of the Sava at Vrbina in order to establish the existence and state of conservation of archaeological structures and identify changes in the landscape. The research showed that in the last 200 years the Sava has strongly transformed the Holocene floodplain, with only individual islands/belts of older surface remaining (Mlekuž, 2008; Mlekuž, 2009; Mlekuž, 2009–2010).

More extensive field research was carried out between 2007 and 2009 in the context of construction of the Brežice HPP, with extensive and intensive archaeological surveys on the right and left banks of the Sava between Krško and Brežice. During the course of this research, a higher concentration of early modern era finds and worked limestone was uncovered in the Zasavje area. The remains of foundations were still visible in 2007 (Mlekuž and Pergar 2009).

Taking the results of previous research as a basis, archaeological research was also carried out in 2009 by means of shovel test pits. These revealed fragments of early modern era ceramics and the remains of buildings, whose position coincided with the buildings drawn into the Franciscan cadastral survey (Črešnar and Butina, 2009).

In 2014 and 2015 research was carried out within the entire registered archaeological area "Krška Vas – Zasavje archaeological site (EŠD 10782)" by means of mechanically dug trial trenches, which were used to try and accurately identify the position and content of the archaeological remains. An area of great archaeological potential was delineated on the basis of the small finds and structures identified in this process (Lazar, 2015; Černe and Rižnar, 2015).

Archaeological excavations in 2015

Archaeological excavations in the area of the planned wildlife escape structure for the Brežice HPP in parcel numbers 1823/1, 1823/2, 1840/1, 4795/27, 4795/28, all in the Krška Vas cadastral district, provided limited evidence of human use of the area in the past.

Apart from pit SU 013/025/014 and the ruins and remains of the foundations of a small structure (SU 012, 016/017, 018, 019/020 and 023), the function of which we were unable to ascertain owing to the considerable damage, we did not uncover other archaeological structures.

Although we came across a large quantity of early modern era pottery in the arable soil layer and on the surface of layer SU 002, which might indicate the presence of an early modern era settlement in the vicinity, it could on the other

hand simply be the consequence of intensive tilling and fertilisation of the fields that were present in this location more than 200 years ago. The field division and ploughing direction have not significantly changed at least since the time of the Franciscan cadastral survey.

During excavation we discovered that the surface in the southern portion of the excavation field was strongly subject to the action of water (the discovery of filled river channel SU 004), probably in the period immediately before the appearance of the structures in the direct vicinity. In more recent times, during the construction of the motorway, the field path was metalled, the roots of trees and bushes were dug up and the pits were filled with waste material.

Finds

During the preliminary archaeological investigations in the area of the planned construction of a wildlife escape structure next to the motorway as part of the Brežice HPP project (Zasavje), a total of 1,595 finds from various periods were uncovered; prevalent among them, with 1,152 fragments, are pottery finds. Construction material, metal, glass, tiles, bones, etc., are present in smaller amounts. The majority of the material belongs to the early modern period, although there are also individual fragments of Roman and late medieval ceramics.

In this paper we present a selection of the most significant finds with a known archaeological context that we are able to define more narrowly in typological and chronological terms using material from reliably stratigraphically dated contemporary sites elsewhere in Slovenia and central Europe for comparison purposes. All finds are temporarily held by the CPA at the ZVKDS.

The presented ceramic material includes better conserved and characteristic pieces such as pot rims, decorated pot walls and almost intact pots. Two small fragments of the walls of Roman era pots have been identified as the oldest finds, although it is not possible to talk about a more precise typological and chronological definition.

Late medieval and early modern era pottery is present in the numerically largest quantity. Comparisons with material from contemporary sites in Slovenia allows us to date this material approximately to the period between the end of the fifteenth century and the start of the seventeenth. The pieces are made from small-grained and, to a lesser extent, fine-grained clay bodies (fabrics) with inclusions of mica, quartz and calcium carbonate in various combinations. They were fired using both the oxidation method and the reduction method. The colours of vessels made and shaped on a fast potter's wheel include shades of pink, brown and grey. The majority of pots have been exposed to fire, as shown by traces of scorching on the outside. Individual

early modern era pots are covered either on the outside surface or on both surfaces by a green or yellow-brown glaze. Predominant among the ceramic material is coarsely made kitchenware consisting of pots with simple decoration in the form of engraved horizontal lines or grooves (Cat. 13, 25, 27) and an applied moulded rib (Cat. 52). There is less decorated and undecorated tableware. Pot rims are present in considerable number. Everted pot rims vary in shape, being simply rounded (Cat. Nos 1, 11, 25, 42), angular (Cat. Nos 2, 8, 37–39), strongly thickened with varying edge profiles (flat, oblique, convex, concave) (Cat. Nos 10, 13, 17, 21, 22–24, 27, 40, 45), thinned (Cat. Nos 12, 47), broad carinated (Cat. Nos 3, 6, 44) and with multiple profiles (Cat. Nos 26, 43, 48). Some have a hollow or support for a lid. Judging from the technology of manufacture (wheel-shaping) and the high degree of hardness of the ceramic material, they are of more recent origin. Comparisons are mainly found among the late medieval and early modern era material from finds such as Leskovec 2 near Celje, Polhov Gradec, Trdnjava Kostanjevica, Šentvid pri Stični, Smednik, etc. (Čeh, 2015: 154–157; Železnikar, 2002: 357–371; Predovnik, 2003: 198–215; Štular, 2013: 171–172; Porenta et al., 2015: 388–395). Similar early modern era pottery was also discovered in the course of archaeological investigations in the area of the planned construction of the high-water dyke with sealing membrane for the Brežice HPP in 2015 and 2016 (Lazar, Rižnar, 2015: Annexes 8 and 20; Černe et al., 2016: 29, Annex 7).

Surviving tableware consists of sherds of glazed bowls (Cat. Nos 16, 49, 50) and cups (Cat. No. 51). The surviving rim of the bowl catalogued under Cat. No. 49 is covered with a white clay slip coating (or engobe), decorated on its outer surface with green painted decoration and coated with a transparent lead glaze. It is an example of the type of painted, slip-covered ceramics that was in use in present-day northern Italy between the twelfth and fourteenth centuries, after which it was replaced by pottery covered with a tin-based glaze, which was the leading technique used in the decoration of tableware. A return of cheap, slip-covered ceramicware imitating more expensive maiolica can be observed from the sixteenth century onwards (Mileusić, 2011: 37–46). Analogies for the above bowl with "monochrome" painted decoration, which was presumably used for serving and eating food, are found in material from Piran dating from the sixteenth and seventeenth centuries (Cunja, 2004: 97) and in the accumulation of Renaissance ceramic finds from Osp Cave in Slovenian Istria (Cunja, 2000: 71, t.). III. 8).

In addition to pottery, part of a stove tile decorated with a plant pattern and the upper part of a bottle with an oval or pear-shaped body were discovered. The latter is a hand-blown bottle made of greenish glass with a cylindrical neck and a slightly everted rim, which was probably used to store liquids. Similar bottles from Lower Austria allow us to date it to the sixteenth or seventeenth century (Tarcasy, 2008: R-G 101–102, 138).

On the basis of the finds, it is possible to trace settlement in the area under consideration from the Roman period onwards. Settlement and use of the land were more intensive in the early modern era, at the time of the existence of the village of Zasavje, which was several times badly affected by multiple catastrophic floods of the river Sava in the Krško urban area and the surrounding countryside, recorded from 1628 onwards (Šebek, 2009: 99; Škofljanec, 2001: 205). A large number of metal, iron objects, for the most part nails, were discovered in the fills of pit SU 014. In addition to small nails (Cat. Nos 29–32), two horseshoe-shaped iron objects that represent shoe fastenings were found in the pit (Cat. Nos 28, 33). Evidently a pair of shoes were thrown into the pit. The organic material (leather) from which the shoes were presumably made has rotted and decayed, and only the metal parts have remained. The metal material can be dated to the same period as the other material from the pit. A number of metal finds were also discovered in ruin SU 012 (Cat. Nos 35, 36), which is probably part of the wooden structure of a demolished building. Also interesting is the bronze tongue of a buckle (Cat. No. 5) discovered in SU 008, although its dating and exact function cannot be determined.

Catalogue

(SU – stratigraphic unit, q. – quadrant, rec. rim diam. – reconstructed rim diameter, ext. h. – extant height, l. – length, w. – width, ext. s. – extant size)

1 SU 008, q. D 24

Pot rim and wall. Small-grained fabric. Oxidation fired. Inner and outer surfaces are pale brown (10 YR 7/4). Traces of fire on the edge of the rim – uniform black-grey darkening (10 YR 3/1). Rec. rim diam. 9.4 cm; ext. h. up to 2.9 cm.

2 SU 008, q. D 22

Pot rim. Small-grained fabric. Reduction fired. Inner and outer surfaces are very dark grey (10 YR 3/1). Rec. rim diam. 9 cm; ext. h. up to 2.6 cm.

3 SU 008, q. C 21

Pot rim. Small-grained fabric. Reduction fired. Inner and outer surfaces are very dark grey (10 YR 3/1). Rec. rim diam. 14 cm; ext. h. up to 2.6 cm.

4 SU 008, q. /

Pot bottom. Small-grained fabric. Reduction fired. Inner and outer surfaces are dark grey (10 YR 4/1). Rec. rim diam. 8.6 cm; ext. h. up to 1.6 cm.

5 SU 008, q. B 24

Bronze tongue. L. 2.2 cm, w: 0.5 cm.

6 SU 006, q. A 15

Pot rim. Small-grained fabric. Oxidation fired. Inner and outer surfaces are light grey (5Y 7/1). Traces of fire on outer surface – patches of very dark grey (10 YR 3/1). Rec. rim diam. 16 cm; ext. h. up to 2.1 cm.

7 SU 006, q. D 24

Ribbon handle. Small-grained fabric. Oxidation fired. Inner and outer surfaces are pink (7.5 YR 8/4). Ext. s. 2.2 x 4 cm.

8 SU 005, q. C 23

Pot rim and wall. Small-grained fabric. Oxidation fired. Inner surface pale brown (10 YR 7/3), outer surface light brown-grey (10 YR 6/2). Traces of fire on outer surface – patches of very dark grey (10 YR 3/1). Inner surface and part of outer surface covered with olive green glaze. Rec. rim diam. 12.8 cm; ext. h. up to 5.1 cm.

9 SU 005, q. C 19

Vessel rim. Small-grained fabric. Oxidation fired. Inner and outer surfaces are pink (7.5 YR 8/4). Traces of fire on outer surface – patches of black-grey (10 YR 3/1). Rec. rim diam. 17.6 cm; ext. h. up to 2 cm.

10 SU 002, q. D 15

Pot rim and wall. Small-grained fabric. Oxidation fired. Inner and outer surfaces are pink (7.5 YR 7/4). Traces of fire on outer surface of rim edge – patches of grey (10 YR 5/1). Rec. rim diam. 20 cm; ext. h. up to 4.8 cm.

11 SU 002, q. D 15

Pot rim and wall. Small-grained fabric. Reduction fired. Inner surface is brown (7.5 YR 5/3), outer surface is dark grey (10 YR 4/1). Traces of fire on outer and inner surfaces – patches of very dark grey (10 YR 3/1). Rec. rim diam. 13.6 cm; ext. h. 3.6 cm.

12 SU 002, q. B 12

Pot rim. Small-grained fabric. Oxidation fired. Outer and inner surfaces are very pale brown (10 YR 7/3) and covered with dark green glaze. Rec. rim diam. 16 cm; ext. h. up to 1.9 cm.

13 SU 002, q. D 12

Pot rim. Small-grained fabric. Reduction atmosphere. Outer and inner surfaces are dark grey (7.5 YR 4/1). Rec. rim diam. 17.8 cm; ext. h. up to 2.2 cm.

14 SU 002, q. D 15

Small pot rim and wall. Small-grained fabric. Reduction fired. Outer and inner surfaces are dark greyish brown (10 YR 4/2). Traces of fire on outer and inner surfaces – patches of very dark grey (10 YR 3/1). Rec. rim diam. 12 cm; ext. h. up to 2.3 cm.

15 SU 002, q. C 20

Bowl rim and wall. Small-grained fabric. Reduction fired. Outer and inner surfaces are dark grey (10 YR 4/1). Traces of fire on inner surface – patches of very dark grey (10 YR 3/1). Rec. rim diam. 20 cm; ext. h. up to 5.2 cm.

16 SU 002, q. B 12

Bowl rim. Small-grained fabric. Reduction fired, oxidation atmosphere in the final phase. Outer and inner surfaces are pink (7.5 YR 7/4). Inner surface coated with a light yellow-brown glaze. Rec. rim diam. 28.4 cm; ext. h. up to 2.2 cm.

17 SU 002, q. D 13, 14

Vessel rim. Small-grained fabric. Reduction fired. Outer and inner surfaces are very dark grey (2.5 YR 3/1). Ext. s. 2.4 x 2.2 cm.

18 SU 002, q. B 18

Bowl rim and wall. Small-grained fabric. Oxidation fired. Outer and inner surfaces are light brown (7.5 YR 6/4). Ext. s. 3.2 x 2.8 cm.

19 SU 002, q. B 18

Vessel handle. Small-grained fabric. Oxidation fired. Outer and inner surfaces are light red-yellow (5 YR 6/6). Traces of fire on inner surface – patches of very dark grey (10 YR 3/1). Ext. s. 3.8 x 2.2 cm.

20 SU 002, q. D 12

Iron nail. L. 6.3 cm, w: 1.1 cm.

21 SU 013 = 025, q. D 14

Pot. Small-grained fabric. Oxidation fired. Inner and outer surfaces are pale brown (10 YR 6/3). Traces of fire on outer surface – patches of black-grey (10 YR 3/1). Rec. rim diam. 20 cm; ext. h. up to 22 cm.

22 SU 013 = 025, q. D 14

Pot rim and wall. Small-grained fabric. Oxidation fired. Inner and outer surfaces are very pale brown (10 YR 7/4). Rec. rim diam. 16 cm; ext. h. up to 6.8 cm.

23 SU 013 = 025, q. D 14

Pot rim. Small-grained fabric. Oxidation fired. Inner and outer surfaces are very pale brown (10 YR 7/4). Patches of grey (10 YR 5/1). Rec. rim diam. 19.8 cm; ext. h. up to 1.8 cm.

24 SU 013 = 025, q. D 14

Pot rim. Small-grained fabric. Oxidation fired. Inner and outer surfaces are light brown (7.5 YR 6/4). Rec. rim diam. 24 cm; ext. h. up to 2.7 cm.

25 SU 013 = 025, q. D 14

Pot rim and wall. Small-grained fabric. Reduction fired. Inner surface is brown (7.5 YR 5/3), outer surface is very dark grey (GLEY 3/). Horizontal groove on outer surface of shoulder. Traces of fire on outer surface – patches of very dark grey (10 YR 3/1). Rec. rim diam. 13.6 cm; ext. h. up to 7.8 cm.

26 SU 013 = 025, q. D 14

Pot rim. Small-grained fabric. Oxidation fired. Inner and outer surfaces are red-yellow (7.5 YR 7/6). Rec. rim diam. 18.6 cm; ext. h. up to 2.8 cm.

27 SU 013 = 025, q. D 14

Pot rim and wall. Small-grained fabric. Oxidation fired. Inner and outer surfaces are very pale brown (10 YR 7/3). Traces of fire on outer surface – patches of very dark grey (10 YR 3/1). Rim diam. 18 cm; ext. h. up to 4.4 cm.

28 SU 013 = 025, q. D 14

Iron shoe fastening. L. 6.5 cm, w: 6 cm.

29 SU 013 = 025, q. D 14

Iron nail. L. 2 cm, w: 1.1 cm.

30 SU 013 = 025, q. D 14

Iron nail. L. 1.8 cm, w: 1 cm.

31 SU 013 = 025, q. D 14

Iron nail. L. 1.7 cm, w: 0.9 cm.

32 SU 013 = 025, q. D 14

Iron nail. L. 1.8 cm, w: 1.1 cm.

33 SU 013 = 025, q. D 14

Iron shoe fastening. L. 6.5 cm, w: 6 cm.

34 SU 012, q. D 12

Iron object, probably a nail. L. 3.5 cm, w: 1 cm.

35 SU 012, q. D 12

Iron plate. L. 4.5 cm, w: 1 cm.

36 SU 012, q. D 12

Iron nail. L. 4 cm, w: 1.4 cm.

37 SU 001, q. /

Pot rim and wall. Small-grained fabric. Oxidation fired. Outer and inner surfaces are very pale brown (10 YR 7/3). Traces of fire on inside of rim – patches of dark grey (10 YR 3/1). Rec. rim diam. 22.4 cm; ext. h. 4.1 cm.

38 SU 001, q. D 10

Pot rim and wall. Small-grained fabric. Oxidation fired. Outer and inner surfaces are very pale brown (10 YR 7/3). Traces of fire on inside of rim and outer surface – patches of very dark grey (10 YR 3/1). Rec. rim diam. 16 cm; ext. h. up to 2.9 cm.

39 SU 001, q. C 13

Pot rim. Small-grained fabric. Reduction fired. Inner and outer surfaces are very dark grey (2.5 YR 3/1). Rec. rim diam. 16.8 cm; ext. h. up to 2 cm.

40 SU 001, q. D 16

Pot rim. Small-grained fabric. Oxidation fired. Inner and outer surfaces are very pale brown (10 YR 7/3). Traces of fire on outer surface – patches of very dark grey (10 YR 3/1). Rec. rim diam. 20 cm; ext. h. 1.9 cm.

41 SU 001, q. C 13

Pot rim. Small-grained fabric. Incomplete oxidation firing with smoking in the final phase. Inner and outer surfaces are pink (7.5 YR 7/4). Traces of fire on outer and inner surfaces – patches of very dark grey (10 YR 3/1). Rec. rim diam. 20.8 cm; ext. h. up to 2 cm.

42 SU 001, q. B 23

Vessel rim. Small-grained fabric. Oxidation fired. Inner and outer surfaces are red-yellow (7.5 YR 7/6). Rec. rim diam. 13.6 cm; ext. h. up to 1.7 cm.

43 SU 001, q. B 19

Pot rim. Small-grained fabric. Reduction fired. Inner and outer surfaces are grey (10 YR 5/1). Rec. rim diam. 18 cm; ext. h. up to 2 cm.

44 SU 001, q. D 3

Pot rim. Small-grained fabric. Reduction fired. Inner and outer surfaces are grey (10 YR 5/1). Rec. rim diam. 13.2 cm; ext. h. up to 2 cm.

45 SU 001, q. D 16

Pot rim. Small-grained fabric. Oxidation fired. Inner and outer surfaces are very pale brown (10 YR 7/3). Ext. s. 2.5 x 2.4 cm. Rec. rim diam. 20.1 cm.

46 SU 001, q. D 1–D 26

Pot rim. Small-grained fabric. Reduction fired. Inner and outer surfaces are grey-brown (10 YR 5/2). Rec. rim diam. 17.6 cm; ext. h. up to 2.5 cm.

47 SU 001, q. D 1–D 26

Small pot rim. Small-grained fabric. Oxidation fired. Inner and outer surfaces are very pale brown (10 YR 7/3). Traces of fire on outer surface – patches of very dark grey (10 YR 3/1). Inner surface and outer edge of rim coated with dark green glaze (also traces of brown glaze on outer edge). Rec. rim diam. 20 cm; ext. h. up to 2.2 cm.

48 SU 001, q. C 6, D 6

Pot rim. Small-grained fabric. Reduction fired. Outer and inner surfaces are very dark grey (GLEY 3/). Rec. rim diam. 11.6 cm; ext. h. up to 2.3 cm.

49 SU 001, q. C 5, D 5

Bowl rim. Fine-grained fabric. Oxidation fired. Inner and outer surfaces are red-yellow (7.5 YR 7/6), covered with a slip and coated with glaze. Traces of painting with green paint (10 YR 8/2) on slip below glaze on outer edge of rim. Rec. rim diam. 22 cm; ext. h. up to 2.6 cm.

50 SU 001, q. D 13

Bowl rim. Fine-grained fabric. Oxidation fired. Inner and outer surfaces are pink (7.5 YR 7/4). Inner surface is coated with fine coating of red pigment (2.5 YR 4/6). Rec. rim diam. 15.2 cm; ext. h. up to 1.8 cm.

51 SU 001, q. D 1–D 26

Cup rim. Fine-grained fabric. Oxidation fired. Inner surface is pink (7.5 YR 7/4). Outer surface is coated with brown glaze. Rec. rim diam. 6 cm; ext. h. up to 1.8 cm.

52 SU 001, q. D 14

Vessel wall. Small-grained fabric. Oxidation fired. Outer and inner surfaces are very pale brown (10 YR 8/3). Outer surface is decorated with applied rib with fingerprints. Rec. rim diam. 3.2 x 2.2 cm.

53 SU 001, q. D 13

Pot bottom. Fine-grained fabric. Oxidation fired. Outer and inner surfaces are very pale brown (10 YR 8/3). Remains of dark brown clay coating (10 YR 3/1) on outer surface. Rec. bottom diam. 3.6 cm; ext. h. up to 1.8 cm.

54 SU 001, q. C 26

Stove tile fragment. Small-grained fabric. Oxidation fired. Outer and inner surfaces are very pale brown (10 YR 7/3). Outer surface is decorated with plant pattern. Ext. s. 5.1 x 5 cm.

55 SU 001, q. D 11

Rim, neck and wall of bottle. The bottle was made from transparent glass of a green shade, using a blowing technique. Nacreous iris on outer surface. Rec. rim diam. 3 cm; ext. h. up to 4.2 cm.

Conclusion

As a result of the action of water, deep ploughing and more recent construction interventions, the research area has undergone significant transformation in the recent past. During excavations we discovered two archaeological structures (a pit and the foundations of a small building). Both structures were discovered on the far north-eastern edge of the excavation field. We therefore predict that the greater part of the site had already been destroyed previously as a result of the powerful action of water that we also identified in the bed of the river channel discovered in the southern part of the site. The pit and the structure to which the uncovered foundations belong can be dated, on the basis of small finds, to the period between the end of the fifteenth century and the start of the seventeenth. The exact functions of the two structures are not known to us, but it is probable that they were part of activities that were carried out on the margins of an independent farm that stood to the north of our excavation field. We also uncovered some small finds in alluvial layers that we are able to date to the Roman period, which indicates that we may conditionally also expect to find the remains of Roman settlement in the wider area. Despite the limited number of finds and archaeological structures discovered, the site complements the archaeological picture of settlement in the wider area of the village of Zasavje in the early modern period, and at the same time offers us an insight into the changing landscape of the Lower Sava Valley and the impact of the action of the river Sava on settlement patterns and land use through time.

Summary

The Centre for Preventive Archaeology of the Institute for the Protection of Cultural Heritage of Slovenia carried out archaeological excavations in the area of a planned wildlife escape structure at the Brežice hydropower plant. The area in question lies within an area that is entered in the Register of Immovable Cultural Heritage as “Krška Vas – Zasavje archaeological site (EŠD 10782)”. Research was limited to the area of the future embankment, which covers an area measuring approximately 128 x 20 m. Within this area we excavated and documented an area measuring approximately 2,130 m². Mechanical excavation went from a depth of 0.30 m to 1.50 m. The archaeological research was carried out under the leadership of archaeologist Miha Murko in July and August 2015. The area under consideration lies directly next to the Ljubljana–Obrežje motorway section and is approximately 600 m north of Krška Vas. The village of Zasavje is believed to have stood here until 1781, when it was completely de-

stroyed or washed away by devastating floods. Following these floods, the village was only partly repaired and re-settled, before being definitively abandoned in the early twentieth century.

The geological substrate of the surveyed area consists of sandy gravel of predominantly carbonate composition, which is alluvium of the Sava. The area lies on the youngest Sava terrace, formed in the Holocene by cutting or eroding into its own Pleistocene fill (Rižnar 2015). The morphology of the surface indicates a large number of abandoned channels or backwaters left behind by the Sava.

The motorway was also constructed here before the first major archaeological investigations of this area. Through archaeological investigations carried out between 2007 and 2009, archaeologists discovered and located remains that can be linked to the village. In this period, as part of the archaeological investigations connected to the construction of the Brežice hydropower plant, an extensive archaeological survey was carried out which indicated the possibility of the existence of an early modern period archaeological site on the right bank of the Sava (Mlekuž, Pergar 2009, 12). Because of this, an intensive archaeological survey was also conducted, which confirmed the results of the extensive survey and to a large extent complemented them. In addition to fragmentary material from the early modern period, researchers also discovered the remains of standing structures or the ruins of houses (Mlekuž, Pergar 2009, 18). Archaeological excavations in the area of the planned wildlife escape structure for the Brežice HPP provided limited evidence of human use of the area in the past. Discoveries included a pit dating from the early modern period and the ruin and remains of the foundations of a smaller building whose function could not be ascertained owing to the high level of damage. No other intact archaeological remains were discovered during the investigations. We did however encounter a large quantity of pottery dating from between the late fifteenth and early seventeenth centuries in the arable soil layer and on the surface of the layer. On the one hand this indicates the presence of a nearby settlement in the early modern period, while on the other it could be the consequence of intensive tilling and fertilisation of fields that existed in this area more than 200 years ago. The field division and ploughing direction have not significantly changed at least since the time of the Franciscan cadastral survey. During excavation we discovered that the surface in the southern portion of the excavation field was strongly subject to the action of water, probably in the period immediately before the appearance of the structures in the direct vicinity. In more recent times, during construction of the motorway, the field path was metalled, the roots of trees and bushes were dug up and the pits were filled with waste material.

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Nove smernice za upravljanje arheoloških najdišč

ICOMOS-ove Salalaške smernice

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Povzetek

Prispevek zgoščeno predstavlja nekatere poudarke ICOMOS-ovih Salalaških smernic, zadnjega dokumenta na področju varovanja in upravljanja arheološke dediščine, ki je bil sprejet na generalni skupščini ICOMOS-a leta 2017 v New Delhiju. Salalaške smernice za upravljanje arheoloških najdišč, odprtih za javnost, se prepletajo s Salalaškimi priporočili o arheoloških parkih in najdiščih (spletni vir 1). Te smernice so bila sprva osnovane za najdišča, ki so povezana s programom najdišč svetovne dediščine, vendar pa so predlogi namenjeni vsem deležnikom vseh javno odprtih arheoloških najdišč.

V Salalaških smernicah¹ so podana nova priporočila za varovanje in predvsem trajnostno upravljanje ne samo arheoloških najdišč, ampak tudi širših spomeniških območij. Nova priporočila poudarjajo pomen neposrednega vplivnega območja (angl. *buffer zone*) in omogočajo tudi njegovo varovanje. Plod mednarodnega sodelovanja strokovnjakov ICOMOSa iz različnih strok, ki bo v letu 2020 potekalo že 55. leto, se tudi na področju nepremične kulturne dediščine oz. arheologije kaže v že predhodno sprejetih listinah, priporočilih in konvencijah, ki so bile podlaga za Salalaške smernice. Te smernice, ki so priporočilne narave, nadgrajujejo trajno varovanje na podlagi priporočil za trajnostno upravljanje najdišč in spomeniških območij. V nadaljevanju podajamo nekaj ključnih izhodišč Salalaških smernic (spletni vir 2).

¹ Za ime dokumenta v nadaljevanju se uporablja krajše poimenovanje Salalaške smernice.

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Uvod

Na drugem kongresu arhitektov in specialistov za zgodovinske objekte leta 1964 v Benetkah je bilo sprejetih trinajst resolucij, ki jih poznamo kot mednarodno listino o restavraciji, bolj znano kot Beneška listina. Listina je nastala neodvisno od že uveljavljenega združenja muzeologov ICOM, kot potreba po organiziranju strokovnjakov s področja konservatorstva in restavracije.

Hkrati z Beneško listino je bil na podlagi resolucije (*Resolution concerning the creation of an international non-governmental organisation for monuments and sites*) in pod pokroviteljstvom organizacije UNESCO leta 1965 v Varšavi ustanovljen Mednarodni svet za spomenike in spomeniška območja (*International Council on Monuments and Sites*, ICOMOS) kot nepolitično in nedržavno združenje.

ICOMOS sestavljajo poleg generalne skupščine (angl. *General Assembly*) še svetovalni odbor (angl. *Advisory Committee*), izvršilni odbor (angl. *Executive Committee*) ter pisarna in mednarodni sekretariat (*Bureau and the International Secretariat*) s sedežem v Parizu.

ICOMOS je združenje strokovnjakov z vsega sveta in trenutno povezuje več kot deset tisoč članov v več kot 151 državah, 107 nacionalnih komitejev. Primarna funkcija ICOMOS-a na mednarodni ravni, kjer nastopa kot eden izmed svetovalnih organov na področju kulturne dediščine za UNESCO, je vrednotenje nominacij za kulturno in integralno svetovno dediščino (*World Heritage Sites*) ter svetovanje pri njihovi pripravi.

ICOMOS sodeluje z nacionalnimi in mednarodnimi ustanovami, deluje na področju sprejemanja in nadgradnje mednarodnih listin, priporočil, deklaracij, principov in

konvencij s področja konservatorstva in varovanja kulturne dediščine ter sodeluje pri izobraževalnih programih. Od ustanovitve je ICOMOS pripravil in sprejel na desetine različnih listin, priporočil, deklaracij, nacionalnih listin,² ki so močno vplivale na mednarodno zakonodajo na področju nepremične kulturne dediščine; to se kaže v prvi vrsti pri svetovnih konvencijah (spletni vir 4), povezanih s kulturno oz. arheološko dediščino – kot je na primer konvencija iz Vallette –, ki povzemajo ICOMOS-ova priporočila. Leta 2017 so bile na generalni skupščini v New Delhiju sprejete Salalaške smernice za upravljanje javnih arheoloških najdišč, ki na podlagi različnih listin ICOMOS-a vključujejo celovit nabor različnih priporočil na področju varovanja in upravljanja arheoloških najdišč s ciljem trajnostnega upravljanja.

Salalaške smernice so nastale ob upoštevanju naslednjih dokumentov: Newdelhijskega priporočila o mednarodnih načelih, ki se uporabljajo pri arheoloških izkopavanjih iz leta 1956 (spletni vir 5), ICOMOS-ove mednarodne listine o ohranjanju in obnovi spomenikov in spomeniških območij – Beneške listine iz leta 1964 (spletni vir 6), revidirane Evropske konvencije o varovanju arheološke dediščine – Valletske konvencije iz leta 1992 (spletni vir 7), Unescove konvencije o varovanju svetovne kulturne in naravne dediščine – Pariške konvencije iz leta 1972 (spletni vir 8), Unescovega dodatka Operativne smernice – kulturna krajina 2008 (spletni vir 9), ICOMOS-ove mednarodne listine o ohranjanju in upravljanju arheološke dediščine – Lozanske listine iz leta 1990 (spletni vir 10), ICOMOS-ove Narske listine o avtentičnosti iz leta 1994 (spletni vir 11), Quebeške mednarodne listine o interpretaciji in prezentaciji območij kulturne dediščine iz leta 2008 (spletni vir 12), ICOMOS-ove mednarodne listine o kulturnem turizmu iz Mehike iz leta 1991 (spletni vir 13), Unescove konvencije o varovanju podvodne kulturne dediščine iz leta 2001 (spletni vir 14), Šjanske deklaracije o ohranjanju okolice dediščinskih objektov, najdišč in spomeniških območij iz leta 2005 (spletni vir 15) ter izjave iz Menorce o razvoju in uporabi najboljših praks pri upravljanju arheoloških območij svetovne dediščine iz leta 2012 (spletni vir 16).

Priporočila vseh navedenih listin in dokumentov ICOMOS-a so pripeljala do Salalaških smernic za upravljanje javnih arheoloških najdišč. Priporočila so bila sprejeta na 19. srečanju Generalne skupščine ICOMOS-a v New Delhiju v Indiji 15. decembra 2017.

Preambula smernicam

Arheološka najdišča so pod zakonitim nadzorom deležnikov v državi in regiji, v kateri so. Smernice so predlogi, ki naj bi jih upoštevali tisti deležniki, ki se odločijo za odprtje

arheološkega najdišča za javnost. Smernice niso predvidene kot predpisi ali standardi, saj številni udeleženci, ki so sodelovali pri razvoju teh smernic, javno nasprotujejo njihovem preoblikovanju v predpise in standarde. Predlogi v teh smernicah izhajajo iz skupnih izkušenj tistih, ki so sodelovali pri upravljanju javno dostopnih arheoloških najdišč v mnogih državah in različnih regijah po vsem svetu. Ponujajo jih z vedenjem, da je vsaka država in vsaka regija drugačna in da kulturna raznolikost bogati življenje vsega človeštva. Predlogi, pripravljani v teh smernicah, niso v celoti usklajeni z regionalnim in lokalnim kulturnim upravljanjem arheoloških najdišč, predvsem tistih, ki so javno dostopna, zato se lahko spreminjajo. Arheološka najdišča v sistemih nacionalnih parkov po vsem svetu in predvsem najdišča svetovne dediščine predstavljajo poseben izziv, saj jih turistična industrija trži kot vodilne destinacije. To je postalo jasno v desetletjih po ratifikaciji Konvencije o varstvu svetovne naravne in kulturne dediščine leta 1972. Od takrat se podobne težave vztrajno pojavljajo pri upravljanju arheoloških najdišč, odprtih za javnost. Zato so te smernice namenjene zmanjšanju verjetnosti, da se takšni problemi na arheoloških najdiščih, odprtih za javnost, razvijejo in postanejo nepopravljivi. Nameni in cilji teh smernic so prepoznavanje raziskav, potrebnih za oceno izvedljivosti vzpostavitve sistemov in okvirov trajnostnega upravljanja arheoloških najdišč, ki so ali najverjetneje bodo odprta javnosti; ter vodenje razvoja trajnostnega sistema upravljanja s sklicevanjem na tako oceno izvedljivosti (Salalaške smernice za upravljanje javnih arheoloških najdišč, 2017 : 1).

Končne cilje teh smernic pa lahko povzamemo na naslednji način: Potrebno je celovito ohranjanje in vzdrževanje arheoloških značilnosti, materialov, najdb in najdišč, dokler jih ni mogoče preučiti na znanstveni način. Zagotoviti je treba modele dobrih praks trajnostnega upravljanja (vključno z uporabo) kulturnih in naravnih virov arheoloških najdišč, odprtih za javnost. Uporaba arheoloških najdišč, odprtih za javnost, je pomembna tudi zaradi povečanja zavesti javnosti o vrednosti kulturne raznolikosti in moči medsebojnih povezav med kulturami na načine, ki so koristni vsem. Obisk arheološkega najdišča nam tako neposredno posreduje »človeško preteklost«, česar ni mogoče zagotoviti z drugimi sredstvi. Torej bi morala biti doživetje in obisk arheološkega najdišča omogočena čim širšemu krogu občinstva, pod pogojem, da obiskovalci ne ogrožajo ali uničujejo fizičnih ostankov iz preteklosti. Medtem ko lahko nadzemne strukture vizualno popravimo in obnovimo, zgodovinska in znanstvena vrednost arheološkega najdišča v celoti temelji na zmožnosti raziskav izvirnega materiala v njegovi prvobitnosti; v tem se arheološka najdišča razlikujejo od vse druge dediščine. Obisk arheološkega najdišča lahko nadgradi širok razpon koristi, tako na družbeni kot ekonomski in kulturni ravni dediščine. Vestno javno predstavljena dediščina bogati naše razumevanje neprekinjenega odnosa med ljudmi in naravo kot tudi skupne in različne načine, na katere se ljudje organizirajo in sodelu-

jejo z drugimi skupinami. To so ključna sodobna vprašanja. Dediščina ima temeljno vlogo pri razvoju kolektivne identitete. Kadar je uporabljena z namenom podpore razlage v korist določenih skupin, se raziskave dediščine, ki izhajajo iz arheoloških raziskav in njihovih materialnih dokazov, lahko prav tako uporabijo za izpodbijanje teh razlag. Javno dostopna arheološka najdišča lahko prinesejo gospodarsko korist, ki deluje trajnostno in hkrati netrajnostno. Trajnostno upravljanje arheoloških najdišč, ki so odprta za javnost, zahteva tudi razumevanje, kako lahko javna dostopnost in izkušnje pripomorejo k varovanju takšnih najdišč. Trajnostno upravljanje zahteva tudi jasno opredelitev, kako lahko razvoj javnega dostopa najdiščem tudi škodi. Nevzdržno izkoriščanje že po definiciji ogroža najdišča, ki so odprta za javnost, in onemogoča prizadevanja za predstavitev človeške zgodovine čim bolj objektivno in s tem na uporaben način. Te smernice so namenjene vsem arheološkim najdiščem, ki so odprta za javnost, imajo pa poseben pomen za najdišča, ki so povezana s programom svetovne dediščine (Salalaške smernice, 2017: 2). Najdišča na seznamu svetovne dediščine bi morala ponuditi uspešne modele trajnostnega upravljanja, ki so lahko uporabni tudi drugod. Predstavijo lahko način vzpostavitve ustanov in programov, uporabnih za varstvo vseh območij kulturne in naravne dediščine, v skladu s cilji, predstavljenimi v 5. členu svetovne konvencije o varstvu kulturne in naravne dediščine (spletni vir 20).

Smernice zagotavljajo časovni načrt za prepoznavanje in razvoj učinkovitih upravljaljskih orodij in sistemov ter potrebne izboljšave že obstoječih. Oblikovanje sprejetih smernic za upravljanje arheoloških najdišč, ki so odprta za javnost, ima tudi strateški pomen. Številni državni in neprofitni razvojni programi pomoči so na voljo državam pogodbenicam in agencijam, ki iščejo pomoč za trajnostni gospodarski napredek. Upoštevanje odobrenih smernic lahko pomaga pri prijavi teh programov ter nudi utemeljitev zahteve za financiranje in tehnično podporo. Razvoj večletnega načrta trajnostnega upravljanja arheološkega najdišča, ki je odprto za javnost, omogoča strukturo za uspešen razvoj.

Ta dokument upošteva preteklo listine in dokumente ICOMOS-a, predvsem načela srečanja iz Ma'agana leta 2002 (Cleere, 2010: 5), ki je kot bistvene elemente za celotno načrtovanje upravljanja opredelil naslednje: temeljno skupno razumevanje lastninske pravice s strani vseh deležnikov; načrtovanja, izvajanja, spremljanja, ocenjevanja povratnih informacij; vključevanje partnerjev in deležnikov; dodelitev potrebnih virov; krepitev zmogljivosti in odgovornosti ter pregleden opis delovanja sistema upravljanja.

Koncept arheološkega parka

Za namene teh smernic je park opredeljen kot zaščiteno območje, dostopno javnosti ter namenjeno uživanju in izobraževanju. Ta opredelitev je združljiva s Salalaškimi priporočili za arheološke parke in najdišča, ki so bila sprejeta na prvi mednarodni konferenci ICOMOS ICAHM o arheoloških parkih in najdiščih med 23. in 25. 2. 2015 v mestu Salalah v sultanatu Oman (spletni vir 17). Po Salalaških priporočilih namreč arheološki park vsebuje nadzemne in pod površinske arheološke ostaline in najdbe ter ga je treba obravnavati kot orodje varovanja, predstavitev in interpretacije arheoloških najdišč na eni strani ter kot sredstvo za razumevanje skupne preteklosti človeštva na drugi strani (Salalaške smernice, 2017: 7). Kot takšne je mogoče razumeti splošne cilje Svetovne konvencije o kulturni in naravni dediščini (spletni vir 8). Park naj bi služil kot didaktični pripomoček, saj odraža koncept skupne zgodovine človeštva, in če je trajnostno upravljan, je lahko primer, kako doseči trajnostno upravljanje tudi na drugih ogroženih krajih, kjer je prisotna pomembna kulturna in naravna dediščina (spletni vir 17).

Smernice

Pripraviti je treba načrt upravljanja, inventarizacijo in vrednotenje najdišča.

Prizadevati si je treba za vključevanje stroškovno učinkovitih, neinvazivnih in nedestruktivnih tehnologij za popis in vrednotenje kulturnih in naravnih virov. Tehnologije naj na primer vključujejo neposredno odkrivanje najdišč in virov ter modeliranje njihove distribucije. Popis in vrednotenje kulturne dediščine je prvi korak pri vzpostavitvi izvedljivosti trajnostnega sistema upravljanja arheoloških najdišč, značilnosti in krajin.

Vrednotenje mora upoštevat tako ranljivost in ogroženost kulturne dediščine kot tudi njeno pomembnost. Upravljalci območja morajo pri identifikaciji in vrednotenju arheoloških najdišč, značilnosti krajine in pripadajočih najdb vključiti in upoštevati verodostojne in mednarodno priznane arheološke strokovnjake. Pomembna novost v sklopu upravljanja arheoloških najdišč so naravni viri, zato je treba narediti popis tako naravnih kot kulturnih virov, pripraviti pa je treba tudi raziskavo, s katero bo mogoče ugotavljati okoljske spremembe, tako tiste, ki lahko ogrozijo arheološke vire, kot tiste, ki lahko koristijo lokalnemu prebivalstvu danes ali v prihodnosti. Upravitelj mora pripraviti celovit in izčrpen popis naravnih virov, ki so ogroženi ali zelo ogroženi v kontekstu širše krajine, katere del je arheološko najdišče, in predvsem tistih območij, ki so povezana z ohranjanjem arheoloških najdb in arheoloških kontekstov. Že na samem začetku projekta je treba zagotoviti posnetke obstoječega stanja ter inventuro in speci-

² Seznam številnih ICOMOS-ovih listin, resolucij in priporočil.

fikacijo stanja celotne infrastrukture, če ta seveda obstaja. Zavarovati je treba tudi območja tradicionalne uporabe (verska in druga praznovanja, zbiranje zdravnih in prehranskih rastlin), ki so pomembna za lokalno prebivalstvo. Pri pripravi je treba zagotoviti dobro dokumentirane in mednarodno priznane najboljše prakse za terenske študije, dokumentacijo, vrednotenje in zaščito arheološke dediščine. Tako kot pri Unescovih spomenikih je pomembna določitev meje območja in območij upravljanja, ki mora biti natančno določena, kot je predlagana v popisu kulturnih in naravnih virov. Najdišče mora biti dovolj veliko in ustrezno konfigurirano, da sta mogoča in verjetna trajnostna zaščita virov in zadovoljstvo obiskovalcev ob upoštevanju trenutnih in potencialnih vplivov virov, ki presegajo predlagane meje. Upoštevati je treba trenutno in potencialno rabo območja znotraj meja najdišča in neposredne okolice ter zunaj varovanega pasu, lastništvo, stroške, povezane s pridobivanjem dovoljenj, razvojem, restavriranjem, konserviranjem in vsakodnevnimi nalogami upravljanja. Načrt upravljanja mora upoštevati učinkovito vodenje in upravljanje z racionalnimi stroški, ki jih lahko nosijo stranke ali stranke s skrbniki, odgovornimi za najdišče. Stalno je treba analizirati trenutno uničenje arheoloških virov in vzroke zanj, potencialne nevarnosti za arheološke vire, raven podpore lokalne in širše javnosti, družbene, politične, okoljske in gospodarske vplive na lokalni ravni ter način in stopnjo, do katere bi bilo treba z ustanovitvijo javnega arheološkega najdišča izboljšati javne dobrine, kot so kakovost naravnega in socialnega okolja, izobraževanje, zdravstvene in varnostne storitve, ki bi se povečale z uporabo javnega arheološkega najdišča. Vplivno območje (angl. *buffer zone*) samo po sebi običajno ne zadostuje za zaščito pred posegi, zato se je treba pogajati s skupnostmi in vladnimi subjekti ter z njimi formalizirati sporazume.

V nadaljevanju podajamo še nekaj pomembnejših poudarkov iz Salalaških smernic, ki so dosegljive tudi v slovenskem jeziku (spletni vir 18).

Pomemben del smernic so tudi ocene ali študije vplivov na okolje, ki jih je treba izvesti za vse načrtovane razvojne posege, ki bi lahko vplivali na kakovost okolja, kot tudi gospodarske posledice, ki vplivajo na okolje. Ocena ali študija vplivov na okolje mora vključiti ekonomsko analizo o potencialnih gospodarskih koristih in obveznostih, ki bi lahko nastale zasebnikom, poslovnim interesom, družbenim skupnostim ali lokalni, regionalni, nacionalni ali svetovni javnosti. Celoten proces je treba izvajati v sklopu načrta spremljanja, s kazalniki, kot so število obiskovalcev, obtok in zadovoljstvo, stanje naravnih in kulturnih virov, objektov in infrastrukture. Predvidene prednostne naloge spremljanja je treba določiti glede na to, kateri viri in izkušnje so ključnega pomena za naravno in kulturno integriteto območja ter za možnosti uživanja območja; kateri viri in izkušnje so bistvenega pomena za ohranitev usklajenosti s kriteriji, ki določajo izjemno univerzalno vrednost najdišča in identificirajo pomembnost generalnega načrta upra-

vljanja oziroma podobnega dokumenta.

Načrt arheoloških raziskav naj vsebuje prednostne naloge, ki bodo omogočile spremljanje stanja oz. motnje arheološkega najdišča v primeru naravnih nesreč (npr. poplave) kot tudi človeškega delovanja (npr. ropanje ali razvoj). V načrtu naj bi bile opredeljene arheološke raziskave, ki so pomembne za najdišče, in zlasti tiste, ki obravnavajo vprašanja nujnosti raziskav terenske arheologije, sodobne okoljske politike in izboljšanja (mednarodnih) odnosov. Prezentacija in interpretacijski načrt sta ključna pri predstavitvi najdišča, zato je treba pripraviti tak načrt, ki ugotavlja interpretativne teme in pod teme, ki najbolje služijo didaktični funkciji najdišča. Načrt je treba nadgraditi vsaj vsakih pet let. V sklop tega načrta je treba vključiti tudi objekte za upravljanje, saj so ti potrebni za zagotavljanje celovitosti, pristnosti in značilnosti, povezanih s pomenom najdišča, in morajo biti jasno določeni.

Poleg kadrovskega (organigram) in finančnega načrta, ki vsebuje organizacijsko shemo, potrebne kvalifikacije za vsa zahtevana mesta ter dolžnosti in odgovornosti za vse zaposlene, je treba pripraviti tudi načrt za sodelovanje s skupnostmi. Ta mora upoštevati, kako naj se deležniki opredelijo, razvrstijo in vključujejo v upravljanje najdišča. Ne smemo pa pozabiti splošnega načrta upravljanja z določili, ki bodo zagotovila trajnostno upravljanje. Splošni načrt upravljanja vsebuje redni načrt vzdrževanja, varnostni načrt, preglednost spremljanja in upravljanja, sodelovanje, obveščanje lokalne in mednarodne javnosti v zvezi z aktivnostmi in rezultati upravljanja ter mrežno povezovanje. Za uspešne odločitve o upravljanju je potrebno tudi spremljanje povratnih informacij. Odločitve, podprte s spremljanjem, bi morale vključiti vse vidike upravljanja in se ne omejevati samo na redno vzdrževanje in finančno vzdržnost, na pridobivanje osebja in upravljanja ter upravljanje, na določitev mejnih zmogljivosti (ki se lahko sčasoma spremenijo glede na zmogljivost upravljanja) in na omejitve možnih sprememb glede na sposobnost upravljanja. Preglednost spremljanja in upravljanja je pomembna tudi za uspešno komunikacijo in koordinacijo med upravljavci in za mrežno povezovanje (Salalaške smernice, 2017:7-11).

Zaključek

Varovanje arheoloških ostalin *in situ* je bilo kot priporočilo prvič predstavljeno v Atenski listini že leta 1931 (spletni vir 19) in kasneje v Beneški listini leta 1964 (spletni vir 6). Načelo ohranjanja arheoloških ostalin *in situ* pa je bilo v revidirano Evropsko konvencijo o varovanju kulturne dediščine vključeno šele leta 1992 (spletni vir 7). Podobno dolgotrajen proces je potekal tudi na področju upravljanja z arheološko dediščino, saj je H. Cleere (1989) je že pred več kot tridesetimi leti v svojem uvodnem članku »The rationale of archaeological heritage management« napovedal,

da upravljanje arheološke dediščine zahteva nov poklic upravitelja (angl. *archaeological heritage manager*), ki bo združeval različne strokovnjake na vseh področjih upravljanja, tudi zakonodaje, financ, komuniciranja na vseh ravneh, trženja, široko razvejane interpretacije tako za turiste, lokalno skupnost in drugo javnost kot tudi za strokovnjake (Cleere, 1989: 17). In vse to se odraža v Salalaških smernicah, v katerih so vključena vsa bistvena priporočila že omenjenih dokumentov. Zato so te smernice namenjene opisu izvedljivosti učinkovitega in trajnostnega upravljanja (Cromer, Williems, 2019: 177).

Seveda pa ne moremo mimo dejstva, da so številne mednarodne listine in strokovna priporočila prva stopnica na poti do resnično kvalitetnega varovanja kulturne dediščine. Za to pa kljub vsemu še potrebujemo nadgradnjo v obliki uporabnih razlag teoretičnih ali etičnih izhodišč, ki jih ti dokumenti posredujejo. Za slovenski prostor je to še toliko pomembnejše, saj je zanj značilno, da si isto misel različno razlagamo ne le različne stroke, ampak celo strokovnjaki sami znotraj iste stroke (Fister, 2003: 13-14).

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- Prispevki v Razpravah so objavljeni v slovenščini in angleščini. Za prevode praviloma poskrbi uredništvo.

- Razprave praviloma obsegajo največ 1,5 avtorske pole (24 strani po 30 vrstic s 64 znaki oz. 46.000 znakov s presledki), prispevki iz sklopa Predstavitve in informacije pa največ 5 strani (9300 znakov).

- Sestavine razprav si sledijo v naslednjem zaporedju: naslov prispevka, izjemoma tudi podnaslov, izvleček, ključne besede, besedilo prispevka, ki je razdeljeno na posamezna poglavja (uvod in sklep sta obvezni poglavji), viri in literatura ter povzetek. Naslov in podnaslov članka, ki primer-no opisujeta vsebino prispevka, naj natančno, vendar kratko in jedrnato označita bistveno vsebino. V prispevku najpomembnejši obravnavani pojmi naj bodo praviloma navedeni na začetku naslova oziroma podna-slova. Naslov naj ne presega priporočenih 140 znakov. Izvleček naj obsega največ 6–10 vrstic (do 650 znakov). Biti mora razumljiv sam po sebi, brez branja celotnega prispevka; vsebuje naj oris metodologije in rezultatov; uporabljajo naj se celi stavki, izogibati se je treba slabše znanim kraticam in okrajšavam. Kratice naj bodo ob prvi uporabi razvezane v slovenskem jeziku. Če to ni mogoče, kratico razvezemo v jeziku, v katerem je nastala. Ključne besede naj obsegajo 3–8 besed, ki označujejo vsebino prispevka; to naj bodo enostavni izrazi, zapisani v prvem sklonu ednine. Avtor naj po-skuša izbrati take ključne besede, ki so že v splošni rabi v sistemu COBISS. Za UDK-vrstilec oz. klasifikacijsko oznako poskrbi uredništvo. Povzetek obsega 30–45 vrstic (največ 1900 znakov). V njem avtor jasno opredeli namene, glavne značilnosti in metodologijo raziskovalnega dela ter naj-pomembnejše rezultate in sklepe prispevka. Besedilo prispevka mora biti pregledno in razumljivo strukturirano z naslovi poglavij in podpoglavij. Dovoljeni sta največ dve ravni podpoglavij. Avtor lahko priloži tudi kratko zahvalo, ki bo objavljena pred seznamom virov in literature.

- Zaradi zagotovitve anonimnosti pri recenzijsem postopku mora(-jo) avtor(-ji) svoje ime in priimek navesti posebej, in sicer na prvi strani pri-spevka. Dopiše(-jo) naj tudi svoj akademski in pedagoški naziv ali znan-stveni naziv ter diplomski naziv. Za diplomske nazive naj se uporabljajo uradne okrajšave, za pedagoške in znanstvene nazive pa naj se okrajša-ve ne uporabljajo. Avtorice naj napišejo svoje pedagoške nazive v ženski obliki (npr. docentka). Sledi naslov institucije, v kateri je avtor zaposlen,

oziroma drugi ustrezen naslov in naslov elektronske pošte. Če je avtorjev več, vrstni red določijo sami. Drugih podatkov naj prva stran prispevka ne vsebuje.

- Za predstavitve knjig in za recenzije (oznaka COBISS 1.19), objavljene v drugem delu revije, mora avtor najprej navesti naslov prispevka. Ta je lah-ko poljuden in ni nujno, da je povsem enak kot naslov knjige ali dela, ki ga avtor predstavlja oziroma ocenjuje, vendar pa se mora nanašati na vse-bino/recenzijo predstavljenega dela oziroma knjige, biti mora čim krajši in čim manj zapleten. Za naslovom mora avtor navesti še: izvirni naslov dela, ime in priimek avtorja(-jev), ime in priimek urednika(-ov), založbo in leto izdaje ter ISBN -številko.

OBLIKOVANJE IN JEZIK PRISPEVKOV

- Prispevki morajo biti napisani z urejevalnikom besedil Microsoft Word. V celotnem prispevku naj bo uporabljen le en slog, in sicer privzet slog Normal. To pomeni, da morajo imeti prispevki enojni medvrstični razmik, tip črk Times New Roman, velikost črk 12, levo poravnavo in 2,5-centi-metrске robove pri formatu A4. Ta normativ je nekoliko drugačen le pri grafičnih prilogah (tip pisave v grafičnih prilogah mora biti Arial, velikost črk pa ne sme biti manjša od 10). Strani v prispevku naj bodo zaporedno oštevilčene, številka strani pa naj bo na dnu strani postavljena na sredino.

- Besedilo prispevka naj bo preprosto oblikovano. Ni dovoljeno uporabljati zamikov, deljenja besed, podčrtavanja, senčenja ali kakršnih koli drugih načinov oblikovanja, razen označitve krepke in ležeče pisave. Besedilo naj bo v celoti izpisano z malimi črkami (razen velikih začetnic) in naj bo brez nepotrebnih okrajšav. Če se okrajšavam ni mogoče izogniti, naj jih avtor pri prvi navedbi pojasni.

- Izvirne izraze/termine lahko avtor zapiše ob izrazih, prevedenih v sloven-ski jezik. Izraz naj avtor zapiše v oklepaju za slovenskim prevodom, pri čemer napiše najprej okrajšavo jezika, v katerem je zapisan izvirni izraz/termin (na primer: angl. (za angleški jezik), nem. (za nemški jezik), fr. (za francoski jezik) itd.), nato izraz/termin, in sicer v ležeči pisavi. Slovenski prevod izraza/termina naj avtor postavi v narekujeja .

- Pri naštevanju in navajanju enot, ki si v alinejah sledijo druga pod drugo, ni dovoljeno uporabljati funkcije za avtomatsko označevanje in oštevilče-vanje, ki jo ima program Microsoft Word. Avtor naj enote, ki si v alinejah sledijo druga pod drugo, številči ali označuje ročno, čeprav zaradi tega be-sedilo ne bo poravnano v navpični liniji. Enako velja tudi za številčenje na-slov, podnaslov, poglavij, podpoglavij, preglednic in slik. Če pri navajanju enot v alinejah avtor ne uporablja številk, naj alineje označi s pomišljaji.

- Prispevki, objavljeni v slovenščini, morajo biti napisani v slovenskem knjižnem jeziku in ob upoštevanju pravil Slovenskega pravopisa (2003, 2007).

- Uporaba tujk v prispevkih v slovenskem jeziku je dovoljena le, če ne ob-staja primernejši izraz v slovenskem jeziku.

PREGLEDNICE IN GRAFIČNE PRILOGE

- Za tabele se v prispevku uporablja poimenovanje preglednica. Pregledni-ce so umeščene med besedilo prispevka in ne smejo presegati 2,5-centimetrskega roba. Vsaka preglednica mora biti razumljiva, pregledna in preprosta, brez dodatnega pojasnjevanja in opisovanja. Sestavljajo naj jo vrstice in stolpci, katerih vidne črte se sekajo v poljih. Polj naj avtorji ne senčijo. Preglednice morajo biti zaporedno oštevilčene z arabskimi števil-kami in morajo imeti naslove. Naslov preglednice naj bo nad preglednico. Med številko in naslovom naj bo dvopičje. Naslovi preglednic naj bodo čim krajši in čim manj zapleteni. Naslov preglednice naj se s piko zaključí le, če gre za stavčno poved. Avtor pod preglednico dopiše tudi vire za podatke v preglednici. Uporabljeni viri morajo biti (v celoti) navedeni v končnem seznamu virov in literature.

- Za vsako grafično prilogo (fotografija, zemljevid, grafikon, skica in podob-no) se uporablja enotno poimenovanje: slika. Slike ne smejo biti umešče-ne med besedilom prispevka. Oštevilčene morajo biti enotno z arabskimi

številkami in morajo imeti naslove. Med številko in naslovom mora biti dvopičje. Naslovi slik naj bodo čim krajši in čim manj zapleteni. Avtor za naslovom dopiše tudi vir(-e) grafične priloge, in sicer na način, kot je za sklicevanje na vire in literaturo med besedilom določeno v teh navodilih. Pri fotografijah in ilustracijah, ki niso vzete iz virov, ampak so avtorsko delo, se za naslovom slike dopišeta ime in priimek avtorja fotografije/ilu-stracije. Naslov slike se za navedbo virov (ali avtorja fotografije/ilustracije/risbe) s piko zaključí le, če gre za stavčno poved.

- Če se avtor med besedilom prispevka sklicuje na grafične priloge (npr. jih opisuje, komentira itd.) oziroma če grafična priloga dopolnjuje besedilo prispevka, mora biti v besedilu obvezno navedeno, na katero grafično prilogo se avtor sklicuje, oziroma mora biti na najprimernejšem mestu v besedilu navedeno, katera grafična priloga dopolnjuje besedilo. Pri sklice-vanju na grafične priloge je treba uporabljati njihove številke: npr. (sl. 1), kot je razvidno s slike 1, kot prikazuje slika 1 itd.

- Če sestavlja eno sliko več grafičnih podob (npr. vertikalni in/ali horizon-talni niz fotografij, skic, tabel itd.), mora biti vsak posamezen sestavni del slike vidno in jasno oštevilčen. V podpisu k sliki naj avtor zapiše številko posameznega sestavnega dela slike in naslov/pojasnilo tega sestavnega dela slike, in sicer na način, kot je navedeno pri spodnjem primeru. Tak naslov grafične priloge se zaključí s piko.

- Če vsebuje grafična priloga besedilo (npr. napisi na skicah, legenda v grafikonu, napisi/besedilna navedba enot na abscisnih in ordinatnih oseh v grafikonih ipd.), mora biti to besedilo napisano v slovenščini in angleščini. Napisi naj bodo čim manj zapleteni in čim krajši (npr. če so v grafikonih napisi oziroma besedilne navedbe enot na abscisnih/ordinatnih oseh in na drugih mestih dolgi, je bolj smiselno, da avtor te enote označi s številkami, številke pa pojasni v legendi).

- Tip pisave v vseh grafičnih prilogah mora biti Arial, črke pa ne smejo biti manjše od 10. Pisava mora imeti enojni medvrstični razmik in levo porav-navo pri formatu A4.

- Grafične priloge (razen grafikonov) morajo avtorji oddati v digitalni rastr-ski obliki, z ločljivostjo vsaj 350 pik na palec (350 dpi), in sicer v forma-tu JPEG (v najvišji kvaliteti) ali TIFF. Širina slike s tako ločljivostjo naj bo najmanj 14,8 cm. Če avtorji ne morejo oddati grafičnih prilog v predpisani obliki, naj se pred oddajo posvetujejo z urednikom.

- Grafikoni morajo biti izrisani s programom Microsoft Excel.

- Vsaka grafična priloga mora biti shranjena in oddana uredništvu v svoji datoteki. Naslov posamezne slikovne datoteke naj bo sestavljen le iz pri-imka (prvega) avtorja, okrajšave sl, podčrtaja in zaporedne številke, ki jo ima slika v besedilu: npr. Fister_sl_1.

- Avtor naj prostor, ki naj bi ga grafična priloga zasedla v prispevku, šteje v obseg besedila kot 250 besed (pol strani) oziroma 500 besed (cela stran).

- Avtorji naj bodo zmerni pri številu grafičnih podob, ki jih nameravajo vključiti v prispevek. Vključijo naj le tiste, za katere menijo, da so potrebne za boljše razumevanje vsebine prispevka.

ŠTEVILKE IN MERILA

- Merske enote naj temeljijo na metričnem merskem sistemu. Pri številih, večjih od 9999, se za ločevanje tisoč in milijonic uporabljajo pike (na primer 13.432 ali 1.514.800). Pri pisanju merila zemljevida se dvopičje piše nestično (na primer 1 : 500.000). Med številkami in enotami je presledek (na primer 135 m, 23,5 %), pred oznako za potenco ali indeksom števila pa presledka ni (na primer 143 km², b₂, 17 °C). Znaki pri računskih operacijah se pišejo nestično, razen oklepajev (na primer p = a + c – b – (a + c : b).

OKRAJŠAVE

- Uporabljajo se slovenske verzije okrajšav in bibliografskih oznak (ur.; idr.; isti.; ista; prav tam).

Okrajšava prim. se uporablja, kadar želimo opozoriti na stališče, ki je dru-gačno od našega ali od tistega, ki ga zagovarja avtor druge citirane knjige.

OPOMBE IN NAVAJANJE VIROV IN LITERATURE

- Bibliografske opombe se pišejo med besedilom, vsebinske opombe pa kot sprotne opombe pod črto.

Vsebinske opombe, ki vsebujejo dodatno avtorjevo besedilo, so oštevilče-ne z zaporednimi številkami od začetka do konca besedila. Opombe naj ne bodo predolge.

- Če je avtor znan, naj bo v besedilu sklic na literaturo tak: (Zadnikar, 1982: 20–23) oziroma npr. Zadnikar (1982) ugotavlja, da ... Če sta avtorja nave-denega dela dva, se navedeta oba: (Buser, Cajhen, 1980) oziroma npr. Buser in Cajhen (1980) ocenjujeta, da ... Pri večjem številu avtorjev se zapiše le

priimek prvega avtorja, za druge avtorje se navede okrajšava idr., ki po-meni in drugi: (Benedetti idr., 2004) oziroma Benedetti idr. (2004) menijo, da ... Če je avtorjev šest ali manj, se v končnem seznamu virov in literature navedejo vsi avtorji, in sicer tako, kot je določeno v teh navodilih. Če je avtorjev več kot šest, se v končnem seznamu virov in literature navede prvih šest avtorjev, za druge pa se doda okrajšava idr., in sicer tako, kot je določeno v teh navodilih. Če je v prispevku uporabljenih več virov, ki imajo na začetku iste avtorje, je treba med besedilom navajati vse avtorje do vključno prvega različnega.

- Dela enega avtorja, ki so izšla istega leta, je treba med seboj ločiti z zapo-rednim dodajanjem malih črk (a, b, c, č itd.) stično ob letnici izida (Božič, 1992a, 1992b) oziroma Božič (1992a, 1992b) navaja ... Tako jih je treba na-vesti tudi v končnem seznamu virov in literature. Dela različnih avtorjev, ki se vsa nanašajo na isto vsebino, je treba naštetí po abecednem redu gle-de na avtorjev priimek, med posameznimi navedbami je podpičje: (Fister, 1987; Stopar, 1990; Zadnikar, 1975). Pri navajanju več del istega avtorja se navedejo avtor in zaporedne letnice izidov teh del, ki jih je treba ločiti z vejico: (Zadnikar, 1982, 1988). Če v besedilu zaporedno navedemo sklic na isto delo, se pri drugem in vseh nadaljnjih zaporednih sklicih v istem odstavku uporabi navedba: (prav tam). Če je delo še v tisku, se v oklepaju namesto letnice izdaje navede: (v tisku) – na ta način se delo navaja tudi v končnem seznamu virov in literature.

- Dobesedni navedki morajo biti označeni z narekovaji, in sicer z dvojnimi srednjimi (« » « »). Stran, na kateri je dobесedni navedek v delu, se napiše za dvopičjem. Pika kot končno ločilo je za oklepajem, v katerem je zapisan vir citata. Če je besedilo citata v citiranem delu na dveh ali več straneh, se med stranema(-nmi) postavi stični pomišljaj (Zadnikar, 1982: 36–37).

- Daljši dobесedni navedki (več kot 40 besed) naj bodo postavljeni v samo-stojen odstavek, napisani naj bodo z ležečo pisavo, pred odstavkom in za njim pa naj bo izpuščena po ena vrstica. Začetek in konec dobесednega navedka se v tem primeru ne označujeta z narekovaji. Pika kot končno ločilo je za oklepajem, v katerem je zapisan vir navedbe.

- Pri dobесednih navedkih, ki imajo vmes posamezne dele izpuščene, se uporablja tropičje v oglatem oklepaju: [...]. Za to oznako, če ni bil izpuščen samo del povedi, začnemo pisati ponovno z veliko začetnico. Če v citi-ranem delu to ni velika začetnica (npr. ker ni začetek stavka), označimo prvo črko z oglatim oklepajem.

- Pri sklicih na vire, pri katerih avtor in urednik nista znana, se navedeta ime izdajatelja (v prispevkih v angleškem jeziku mora biti v tem primeru ime izdajatelja prevedeno v angleščino) in letnica izdaje dela, npr. za po-datke, ki jih objavlja Statistični urad Republike Slovenije, se navede (Sta-tistični urad Republike Slovenije, 2007). Za vire lahko uporabljamo tudi okrajšave, npr. za Statistični urad Republike Slovenije se uporabi okrajšava SURS, vendar mora biti v besedilu prispevka najprej navedeno ime vira v celoti, nato pa mora biti razloženo, da se bo za vir v nadaljevanju upora-bljala okrajšava, ki jo avtor tudi razveže. Za navedeni primer (Statistični urad Republike Slovenije, 2007) bi se tako pri sklicu nanj v nadaljevanju uporabljalo (SURS, 2007).

- Pri navajanju zakonov med besedilom se navedejo ime zakona, številka Uradnega lista Republike Slovenije in letnica, pri čemer se uporablja za Uradni list Republike Slovenije okrajšava: Ur. l. RS, npr. (Zakon o varstvu kulturne dediščine, Ur. l. RS, št. 16/2008). Pri dobесednem navajanju za-konov se doda še stran v Uradnem listu RS.

- Če imajo zakoni uradne okrajšave, npr. ZVKD-1, se lahko te uporabijo, vendar mora biti v besedilu članka najprej navedeno ime zakona v celoti, nato pa mora biti razloženo, da se bo za ta vir v nadaljevanju uporabljala okrajšava, ki jo avtor tudi navede.

SEZNAM UPORABLJENIH VIROV IN LITERATURE

- Vsa dela (viri in literatura), navedena v članku, morajo biti v abecednem seznamu navedena na koncu v sestavnem delu prispevka z naslovom Viri in literatura. Seznama avtor ne sme številčiti ali kakor koli drugače ozna-čevati (s pikami, pomišljaji). V primerih navedb, ki so prikazani spodaj, so ločila in oblika pisave (ležeče oziroma pokonci) navedeni točno tako, kot jih mora navesti tudi avtor v svojem prispevku.

Monografije in knjige (en avtor)

Fister, P. (1986): *Umetnost stavbarstva na Slovenskem*. Ljubljana, Cankarjeva za-ložba.

Opomba: Priimek avtorja, Inicialka(-e) avtorjevega imena. (letnica izdaje dela): *Naslov dela: Morebitni podnaslov*. Kraj izdaje, Založba.

Monografije in knjige (od tri do šest avtorjev)

Pernet, L., Carlevaro, E., Tori, L., Vietti, G., Della Casa, P., in Schmid-Sikimič, B.

| |
|---|
| (2006): <i>La necropoli di Giubiasco (TI): Vol. II, Les Tombes de La Tène finale et d' époque romaine</i> , Collectio archaeologica 4. Zürich, Musée national suisse. |
| Opomba: Če je avtorjev šest ali manj, se v končnem seznamu virov in literature navedejo vsi avtorji. Če je avtorjev več kot šest, se našteje prvih šest, nato pa sledi okrajšava idr. |
| Monografije in knjige (avtorji niso znani, znan je urednik) |
| Dromgoole, S. (ur.) (2006): <i>Legal protection of the Underwater Cultural Heritage: National perspectives in Light of the UNESCO Convention 2001</i> . Leiden, Martinus Nijhoff. |
| Diplomska in magistrska dela, doktorske disertacije, raziskovalna poročila |
| Uhač, M. (2003): <i>Brodolom na rtu Savudrija</i> . Diplomska naloga. Sveučilište u Zadru. |
| Verbič, T. (2008): <i>Poročilo o ogledu arheoloških izkopavanj na lokaciji NUK 2</i> . Raziskovalno poročilo. Ljubljana, Zavod za varstvo kulturne dediščine Slovenije, Območna enota Ljubljana. |
| Prispevki ali poglavja v monografijah, knjigah, enciklopedijah in zbornikih konferenc, zborovanj, seminarjev itd. |
| Dumont, A. (2000): Etat d'un cours d'eau à la fin du 18e siècle : la visite de la rivière d'Ourthe (Belgique). V: Bonnamour, L. (ur.): <i>Archéologie des fleuves et des rivières</i> , str. 25–27. Pariz, Éditions Errance. |
| Opomba: pri zbornikih konferenc, zborovanj, seminarjev itd. naj avtor ne navaja, za katero konferenco, zborovanje, seminar itd. gre, kje in kdaj je tovrstno druženje potekalo in kakšen je bil njegov naslov. Z ležečo pisavo je napisan naslov knjige, monografije, zbornika. |
| Prispevki v monografijah, ki izhajajo v seriji z lastnim naslovom |
| Svetličič, V. (1997): Drobne najdbe iz kovine, jantarja in roževine. V: Horvat, J.: <i>Sermin</i> . Opera Instituti Archaeologici Sloveniae, 3, str. 31–38. Ljubljana, Založba ZRC. |
| Opomba: za naslovom knjige zapišemo tudi naslov serije in številko zvezka (če je zbirka oštevilčena). Oštevilčenje je vedno zapisano v arabskih številkah, tudi če so v knjigi rimske številke. Prav tako izpuščamo oznako za zvezek pred številko (<i>Band, Heft, Vol., No.</i>). |
| Prispevki v periodičnih publikacijah |
| Delak Koželj, Z. (2008): Programski model delovanja etnologa konservatorja. <i>Varstvo spomenikov</i> , 44, str. 256–262. |
| Raban, A. (1992): Archaeological Park for Divers at Sebastos and Other Submerged Remnants in Caesarea Maritima. <i>International Journal of Nautical Archaeology</i> , 21(1), str. 27–35. |
| Opomba: število 21 v oznaki 21(1) je letnik publikacije, 1 pa številka v posameznem letniku. Če publikacija nima številke (npr. če izide le ena publikacija v enem letniku), naj avtor napiše le letnik, vendar ne v oklepaju. Imena revij ni dovoljeno pisati z okrajšavami, napisana pa morajo biti z ležečo pisavo. |
| Gesla v enciklopedijah in leksikonih |
| <i>Slovenski biografski leksikon</i> , s. v. "Turner Pavel". |
| Ulčar, M. (1995): <i>Enciklopedija orožja: Orožje skozi sedem tisočletij</i> . Ljubljana, Državna založba Slovenije, s. v. "Enostrelne zadnjače". |
| Opomba: pri citiranju gesel razširjenih enciklopedij in leksikonov pišemo le naslov (ležeče) in pa izdajo, če jih je na voljo več, ni pa treba zapisati števila zvezkov niti kraja in leta izida. Naslovu sledita kratica s. v. (iz latinskega <i>sub verbo</i> – pod besedo) ter citirano geslo v narekovajih in pokončnem tisku. Kadar navajamo podatke iz manj znanega leksikona ali enciklopedije, moramo seveda v opombo zapisati vse podatke, ki jih pišemo pri monografskih delih. |
| Prispevki v dnevnikih časopisih |
| Petkovšek, J. (2009): Potrebujemo zakon, ne le odlok. <i>Delo</i> , 51(24), 30. 1. 2009, str. 9. |
| Zakoni |
| <i>Zakon o varstvu kulturne dediščine</i> . Uradni list RS, št. 16/2008. Ljubljana. |
| Publikacije, katerih avtor in urednik nista znana – npr. statistični viri, enciklopedije, zemljevidi |

Statistični urad Republike Slovenije (2007): *Statistični letopis 2007*. Ljubljana.

Opomba: najprej je naveden izdajatelj, sledijo leto izdaje, naslov dela in kraj izdaje. V prispevkih v angleškem jeziku morata biti v tem primeru ime izdajatelja in naslov dela prevedena v angleščino.

Rokopisi in tipkopisi, ki niso objavljeni, vendar je letnica nastanka znana

Plesničar – Gec, L. (2000): *Emonski teater*. Tipkopis.

Opomba: najprej je naveden avtor rokopisa/tipkopisa, sledijo letnica in naslov ter podatek, da gre za rokopis/tipkopis.

Rokopisi in tipkopisi, ki niso objavljeni, letnica nastanka pa tudi ni znana

Snoj, D. (1999): *Poročilo o zaščitnih izkopavanjih na lokaciji NUK II*. Tipkopis (prejeto 24. 1. 1999).

Opomba: najprej je neveden avtor rokopisa/tipkopisa, sledijo letnica (kot letnica se navede leto, ko je avtor prispevka vir prejel), naslov, podatek, da gre za rokopis/tipkopis, v oklepaju pa je natančen datum prejetja dela.

Intervjuji, pogovori

Svetina, T. (1995): *Marijina kapelica na Mlinem pri Bledu* (osebni vir 25. 3. 1995).

Opomba: navedejo se intervjuvanec, leto intervjuja, kot naslov pa vsebina intervjuja. V oklepaju je natančen datum izvedbe intervjuja/pogovora.

Splošne opombe

- Če je delo še v tisku, se v oklepaju namesto letnice izdaje navede: (v tisku) – na ta način se delo navaja tudi med besedilom.
- Če je krajev izdaj več, mora avtor navesti enega od njih.
- Če je založnik fakulteta ali oddelek na fakulteti, je treba za krajem izdaje dela najprej navesti univerzo, nato fakulteto in na koncu morebitni oddelek.
- Če sta avtorja dva ali jih je več, se v končnem seznamu virov in literature navedba dela začne vedno s tistim avtorjem, ki je (kot prvi) naveden tudi med besedilom.
- Če isti avtor nastopa enkrat samostojno, enkrat pa kot prvi avtor v skupini več avtorjev, potem v seznamu virov in literature najprej navajamo njegova samostojna in nato skupinska dela; slednja razvrstimo po abecedni glede na priimek drugega (ali po potrebi tretjega) avtorja. Če se isti avtor pojavi večkrat, dela navajamo po letu izdaje – najprej starejša in nato novejša dela.

- Če je naslov citiranega dela v dveh ali več jezikih ali če je celotni prispevek v dveh ali več jezikih, mora avtor za prvo napisanim naslovom zapisati še naslove dela v drugem(-ih) jeziku(-ih), in sicer znotraj oglatih oklepajev. Če je teh naslov več, jih mora med seboj ločiti s poševno črto (/), pri čemer pred njo in za njo ne sme pustiti presledka. Če je dvo- ali večjezični prispevek v publikaciji objavljen na različnih mestih, morajo biti številke strani navedene za vsakega posebej, kot je prikazano v spodnjem primeru:
 - Horvat, J. (2002): The Hoard of Roman Republican Weapons from Grad near Šmihel [Zaklad rimskega republikanskega orožja z Gradu pri Šmihelu pod Nanosom]. *Arheološki vestnik*, 53, str. 117–150 [150–192].
 - Navedba strani se piše s stičnim pomišljajem; avtor naj bo pozoren, da uporablja pomišljaj (–) in ne vezaj (-).
 - Vsaka navedba vira se konča s piko.

- Pri navajanju arhivskih virov je treba v oklepaju navesti ime arhiva ali njegovo okrajšavo, ime fonda in njegovo signaturo, oznako tehnične enote (številko fascikla ali škatle) ter naslov in številko navajanega dokumenta, vse ločeno z vejicami. Poleg tega je – če je to mogoče – smiselno navesti še podatke, ki so na citirani arhivaliji, npr. številko in datum izdaje akta.

Primer navedbe arhivskega vira

Arhiv Republike Slovenije (ARS), Vicedomski urad za Kranjsko, AS 1, šk. 1, akt 942.

40. Vire s svetovnega spleta navajamo, kot je prikazano spodaj. Vedno na koncu navedemo tudi datum, ko je bil vir dostopen na spletu.

Primer navedbe spletnega vira, če je avtor znan

Avramov, D. (2006): Social exclusion and social security. http://www.avramov.org/documents/document7.pdf (dostop 20. 2. 2008).

| |
|---|
| Primer navedbe spletnega vira, če avtor ni znan |
| Internet 1: http://www.international.icomos.org/charters.htm (dostop 15. 9. 2008). |
| Opomba: v prvem primeru se med besedilom navede (Avramov, 2006), v drugem primeru pa (internet 1, 2 ...). |

41. Seznam virov in literature vključuje le dela, ki so dejansko navedena v besedilu prispevka. Vsako enoto v teh seznamih zaključuje pika.

RECENZENTSKI POSTOPEK, LEKTURA IN AVTORSKE PRAVICE

42. Uredništvo sprejema prispevke vse leto. Prispevke morajo avtorji poslati po pošti na naslov uredništva

Zavod za varstvo kulturne dediščine Slovenije
Varstvo spomenikov – uredništvo
Poljanska cesta 40
SI-1000 Ljubljana

- Grafične priloge morajo biti v končni obliki shranjene v podatkovni mapi, ločeno od besedila prispevka. Gradiva ne pošiljajte po e-pošti, ampak ga zapišite na zgoščenko. Zgoščenki priložite iztisi vseh datotek.
- Uredništvo ima pravico, da prispevkov, ki niso v celoti pripravljeni v skladu z navodili za objavo v reviji Varstvo spomenikov, ne sprejme v recenzentski postopek.
- Uredništvo ima pravico, da prispevkov, ki niso napisani v slovenskem knjižnem jeziku, ne sprejme v recenzentski postopek.
- Z rezultatom recenzije članka bo avtor seznanjen najpozneje v treh mesecih od oddaje članka. Če recenzent predlaga spremembe oziroma izboljšave, se članek vrne (prvonapisanemu) avtorju. Morebitne popravke ali spremembe lahko sočasno predlaga tudi uredništvo. Avtor vnese predlagane recenzentove in/ali urednikove popravke in vrne popravljeno besedilo v petih dneh. Vnesene popravke in spremembe preveri urednik. Dovoljeni so le popravki in spremembe, ki jih zahtevata recenzent in/ali urednik.

- Če recenzija ne zahteva popravka ali dopolnitve članka, se avtorju recenzija ne pošlje. V tem primeru uredništvo pošlje (prvemu) avtorju le obvestilo, da bo prispevek objavljen.

- O uvrstitvi objavljenih prispevkov v eno od tipologij dokumentov/del v bibliografskem sistemu COBISS odloča recenzent. Urednik preveri pravilnost odločitve recenzenta. Če se mu zdi recenzentova uvrstitev sporna, se glede uvrstitve dogovorita skupaj. O uvrstitvi nerecenziranih prispevkov v eno od tipologij COBISS-a odloča urednik.

- Pred objavo so vsi prispevki, ki so napisani in oddani v slovenskem jeziku, še lektorirani. Avtorju se lektorirano besedilo pošlje v dopolnitev le, če lektor predlaga večje popravke oziroma vstavi svoje komentarje/pripombe, ki so povezani s strokovno vsebino. V takih primerih avtor popravi ali izboljša besedilo v skladu z lektorjevimi pripombami/komentarji in vrne popravljeno besedilo v treh dneh.

- Prevod se opravi po recenzentskem postopku oziroma po vnosu morebitnih recenzentovih in/ali urednikovih popravkov in pregledu morebitnih predlaganih večjih lektorjevih popravkov oziroma komentarjev/pripomb. Za zagotovitev brezhibnosti prevoda prevedene prispevke pred objavo pregleda oseba, ki uporablja angleščino kot svojo materinščino. Če so predlagani manjši popravki, se prevod avtorju ne vrača, ampak uredništvo vnese popravke na podlagi predlogov govorca materinščine. Če je ugotovljeno, da je prevod jezikovno problematičen, uredništvo poskrbi za njegovo profesionalno lektoriranje. Avtor vrne lektorirano besedilo prevoda v petih dneh. Dopolnjeno besedilo prevoda se še enkrat jezikovno pregleda. Prispevek je objavljen, ko je potrjeno, da prevod ustreza pravopisnim pravilom angleškega jezika in pravilom v teh navodilih.

- Tuji avtorji se za prevod prispevkov iz angleščine v slovenščino dogovorijo z urednikom. Prispevek morajo oddati v brezhibni angleščini. Tudi te prispevke jezikovno pregleda oseba, ki uporablja angleščino kot svojo materinščino.
- Uredniški odbor lahko na predlog urednika ali recenzenta zavrne objavo prispevka.
- Sprejeti bodo samo prispevki, ki še niso bili objavljeni. Če je isti prispevek že v postopku objave v drugi reviji, mora avtor to izrecno navesti.

- Za avtorsko delo, poslano za objavo v Varstvu spomenikov, vse moralne avtorske pravice pripadajo avtorju, materialne avtorske pravice reproduciranja in distribuiranja v Republiki Sloveniji in v drugih državah pa avtor brezplačno, enkrat za vselej, za vse primere, za neomejene naklade in za vse medije neizključno prenese na izdajatelja.

- Avtorji so za objavo grafičnih prilog, za katere nimajo avtorskih pravic, dolžni pridobiti dovoljenje in ga poslati na naslov uredništva.

- Za vse trditve v prispevku odgovarja avtor sam, zato objavljamo le podpisane prispevke.

- Ob izidu prejme vsak avtor članka in vsak recenzent en brezplačen izvod publikacije. Članki niso honorirani.

Instructions to authors for the drafting of articles in *Varstvo spomenikov*

PRESENTATION

1. *Varstvo spomenikov* is Slovenia's main academic and professional journal devoted to the theory and practice of monument protection. It is published by the Institute for the Protection of Cultural Heritage of Slovenia.
2. The journal first appeared in 1946, with one issue published a year up to 2010.
3. The journal is divided into two parts. The first (longer) part contains articles classified according to the COBISS (Co-operative Online Bibliographic System and Services) typology under codes 1.01 to 1.04, where 1.01 means original scientific article, 1.02 means review article, 1.03 means short scientific article and 1.04 means professional article. The articles published in this part of the journal are peer-reviewed and are counted as reference articles in domestic and foreign academic environments. The category of the article is proposed by the author but the final decision is taken by the editorial board on the basis of the reviewer's proposal.

The second (shorter) part, which follows the first, contains reviews (COBISS code 1.19), presentations (of books, projects, events, lectures, conferences, etc.), library information, etc. Articles published in this part of the journal are not subject to peer review. The first part of the journal is called *Razprave* [Papers] and the second *Predstavitve* [Presentations]

TYPE, LENGTH AND STRUCTURE OF ARTICLES

4. The individual issues of the journal are not as a rule thematically oriented. The journal publishes articles from various fields and disciplines (archaeology, ethnology, history of art, architecture, landscape architecture, conservation, restoration, geography, etc.) which follow the scholarly and professional interest of their authors in the protection, research and management of cultural heritage, international acts and national legislation, spatial planning and information technology in the monument protection field, Conservation studies, monument protection history and doctrine, etc.
5. Articles in the *Razprave* section are published in Slovene and English. As a rule translations are arranged by the editorial office.
6. Papers should not exceed 24 pages (30 lines, 64 characters per line) or 46,000 characters with spaces. Articles from the *Predstavitve* section should not exceed 5 pages (9,300 characters).
7. The contents of papers should follow this sequence: title, subtitle (where appropriate), abstract, keywords, text divided into individual chapters (including an introduction and conclusion), list of references and summary. The title and subtitle of the article should accurately but concisely indicate the essential content. As a rule, the most important concepts dealt with in the article should be indicated at the start of the title or subtitle. The maximum recommended length of titles is 140 characters. The abstract should be no more than 6–10 lines long (up to 650 characters). It must be self-explanatory and intelligible to someone who has not read the whole article; it should contain an outline of the methodology used and results obtained; whole sentences should be used and little-known abbreviations should be avoided. Abbreviations should be explained in Slovene at first use. If this is not possible, the abbreviation should be explained in the language in which it originates. Keywords should consist of 3–8 words indicating the content of the article; these should be simple expressions in the nominative singular case. The author should attempt to select keywords that are already in general use in the COBISS system. The UDC call number or classification shall be provided by the editorial office. The summary should be 30–45 lines long (maximum 1,900 characters). In it, the author shall define the purposes, main characteristics and methodology of the research work and the most important results and conclusions of the article. The text of the article must be clearly and intelligibly structured with titles of sections and subsections. A maximum of two levels of subsections (subsections and sub-subsections) are permitted. The author may also include a short acknowledgements section which will be published before the list of references.
8. In order to guarantee anonymity during the peer-review process, the name(s) of the author(s) should only appear on a separate cover page.

Titles and degrees should be included. Official abbreviations should be used for degrees but titles are not abbreviated. Female authors should use the female form of their title (e.g. *docentka*). The cover page should also state the address of the institution where the author is employed (or other appropriate address) and an e-mail address. If the article is the work of more than one author, the authors themselves shall determine the order in which their names appear. The cover page should not contain other information.

9. For book presentations and reviews (COBISS code 1.19) published in the second part of the journal, the author must first indicate the title of the article. This does not necessarily have to be the same as the title of the book or work which the author is presenting or reviewing but must relate to the content/review of the presented work or book and should be as brief and uncomplicated as possible. Following the title, the author must also indicate: the original title of the work, the name of the author(s), the name of the editor(s), the publisher and the year of publication, and the ISBN number.

FORMATTING AND LANGUAGE OF ARTICLES

10. Articles must be written in Microsoft Word format. Only one style should be used throughout the article – the default Normal style. This means that articles must have the following characteristics: line spacing: single; font: Times New Roman; font size: 12 pt; alignment: left; margins: 2.5 cm; A4 format. These rules change slightly in the case of illustrations and tables, where the font must be Arial and the font size must not be smaller than 10 pt. The pages of the article should be numbered in sequence and the page number should appear at the bottom of the page (centred).
11. The text of the article should use simple formatting. The use of indentations, hyphenation, underlining, shading or any other forms of formatting except the use of bold and italics is not permitted. The entire text should be lower-case (with the exception of initial capitals) and should contain no unnecessary abbreviations. If abbreviations cannot be avoided, the author should explain them at first use.
12. The author may include original expressions/terms alongside expressions translated into Slovene. The author should include the expression in brackets after the Slovene translation, following an abbreviation indicating the language of the original expression/term (e.g. Eng. for English, Ger. for German, Fr. for French, etc.) and then the expression/term in italics. The Slovene translation of the expression/term should be placed in inverted commas.
13. Do not use the automatic bullets and numbering functions in Microsoft Word to list items. Items in a list should be numbered or marked manually even though this means that the text will not be aligned vertically. The same applies to numbering the title, subtitle, sections, subsections, tables and figures. If numbers are not used to indicate the items in a list, dashes should be used instead.
14. Articles published in Slovene must be written in standard literary Slovene and observe the rules of Slovene usage as set out in *Slovenski pravopis* (2003, 2007).
15. The use of foreign words in articles written in Slovene is only permitted if a more suitable expression does not exist in Slovene.

TABLES AND ILLUSTRATIONS

16. Tables in the article shall be referred to (in articles written in Slovene) by the expression *preglednica*. Tables are incorporated into the text of the article and must not extend beyond the 2.5-centimetre margin. Each table must be intelligible, clear and simple, without additional explanation or description. Tables should consist of rows and columns intersecting in cells. Cells should not be shaded. Tables must be numbered in sequence with Arabic numerals and must have titles. The title of the table should appear above the table. The number and title of the table should be separated by a colon. Titles of tables should be as short and simple as possible. The title of a table should only end with a full stop if it is a full sentence. The

author must cite the sources of the data in the table below the table. The sources used must be listed (in full) in the list of references at the end of the article.

17. The uniform designation 'Figure' shall be used for all types of illustration (photographs, maps, graphs, sketches, etc.). Figures must not be embedded in the text of the article. They must be numbered in sequence with Arabic numerals and must have titles. The number and title should be separated by a colon. Titles of figures should be as short and simple as possible. The author shall also include the source(s) of the illustration in the manner set out in these instructions for in-text citation of sources and references. In the case of original photographs and illustrations not taken from sources, the name of the photographer/illustrator shall be given after the title of the figure. The title of the figure shall only end with a full stop placed after the citation of sources (or the name of the photographer/illustrator) in the case of a full sentence.
18. If the author refers in the text to a figure (describes it, comments on it, etc.) it must be stated in the text what figure the author is referring to; if a figure complements the text of the article, the figure complementing the text must be indicated at the most appropriate point in the text. When referring to figures in the text, their numbers should be used, e.g. '(Fig. 1)', 'as can be seen from Figure 1', 'as shown by Figure 1', etc.
19. If a figure consists of more than one image (e.g. a vertical and/or horizontal sequence of photographs, sketches, tables, etc.), each individual element of the figure must be visibly and clearly numbered. The caption to the figure must include the number of the individual element of the figure and the title/explanation of this element, in the manner indicated in the example below. Such a title shall end with a full stop.
20. If an illustration contains text (e.g. labels on sketches, legends on graphs, labels/textual indications of units on the X and Y axes of graphs, etc.), this text must be given in Slovene and English. Labels should be as simple and as short as possible (if labels or textual indications of units on the X and Y axes of graphs and elsewhere are long, it is better to label these units with numbers and explain the numbers in a legend).
21. The font used in all illustrations must be Arial and the font size must be no smaller than 10 pt. Single line spacing, left alignment and A4 format must be used.
22. Illustrations (with the exception of graphs) must be delivered as bitmap images with a resolution of at least 350 dpi (dots per inch), in JPEG (highest quality) or TIFF format. The width of an image at this resolution should be at least 14.8 cm. If authors are unable to submit illustrations in the prescribed form, they should consult the editor before submission.
23. Graphs must be in Microsoft Excel format.
24. Each illustration must be saved and submitted to the editorial office in its own file. The filename of an individual image file must have the following format: surname of (first) author, underscore, abbreviation 'sl', underscore, number of the figure in the text, e.g. **Fister_sl_1**.
25. The author should count the space that the illustration will occupy in the article as an amount of text, in other words 250 words (half a page) or 500 words (whole page).
26. Authors should be moderate in their use of illustrations in the article. They should only use those they consider necessary to aid understanding of the content of the article.

NUMBERS AND MEASUREMENTS

27. Metric measurements should be used. In the case of numbers greater than 9999, commas should be used to separate thousands and millions (for example 13,432 or 1,514,800). When giving the scale of a map, a space should be used either side of the colon (for example 1 : 500,000). Numbers and units are separated by a space (for example 135 m, but 23.5%), but a space is not used before superscripts or subscripts indicating powers or indices (for example 143 km², b₂, 17 °C). Symbols in mathematical operations are separated by spaces, except brackets (e.g. p = a + c – b – (a + c : b).

ABBREVIATIONS

28. The Slovene versions of abbreviations and bibliographic references (ur.; idr.; isti.; ista; prav tam) shall be used in articles written in Slovene. The abbreviation 'prim.' (cf.) is used to draw attention to a view which differs from that of the author or from that of the author of another cited work.

NOTES AND REFERENCES

29. Bibliographic references shall be given in the text. Explanatory notes shall be given as footnotes.

Footnotes containing additional text by the author shall be numbered consecutively from the beginning to the end of the text. Footnotes should not be too long.

30. Where the cited author is known, the bibliographic reference in the text should be as follows: (Zadnikar, 1982: 20–23) or, for example, 'Zadnikar (1982) states that...' Where a cited work has two authors, both are cited: (Buser, Cajhen, 1980) or, for example, 'Buser and Cajhen (1980) consider that...' In the case of works by several authors, only the surname of the first author is given, and the abbreviation et al. (meaning 'and others') is used for the other authors: (Benedetti et al., 2004) or 'Benedetti et al. (2004) believe that...' If there are six or fewer authors, all six are cited in the list of references at the end of the article, in the manner specified in these instructions. If there are more than six authors, the list of references at the end of the article cites the first six authors and adds the abbreviation et al. for the others, as specified in these instructions. If the article uses multiple sources with the same initial authors, all the authors up to and including the first different author must be cited in the text.
31. Works by one author published in the same year must be distinguished by the addition of lowercase letters (a, b, c, d, etc.) closed up to the year of publication e.g. '(Božič, 1992a, 1992b)' or 'Božič (1992a, 1992b) mentions that...' This is also how they must be cited in the list of references at the end of the article. Works by different authors all of which relate to the same content should be cited in alphabetical order of the author surname, separated by semicolons: (Fister, 1987; Stopar, 1990; Zadnikar, 1975). When citing two or more works by the same author, cite the author and the years of publication of these works in chronological order, separated by a comma: (Zadnikar, 1982, 1988). If the text contains consecutive references to the same work, the abbreviation *ibid.* is used in the second and all subsequent consecutive references in the same paragraph. If a work is still in the process of being published, use the wording 'in press' in brackets instead of the date of publication – this is also the way to cite the work in the list of references at the end of the article.
32. Quotations should be placed inside single inverted commas. The page on which the quotation appears in the work is indicated after a colon. A full stop is placed as final punctuation after the bracket containing the source of the quotation. If the text of the quotation in the cited work is on two or more pages, an unspaced dash is placed between the page numbers (Zadnikar, 1982: 36–37).
33. Longer quotations (over 40 words) should be placed in a separate paragraph and written in italics. A blank line should be left before and after this paragraph. In this case inverted commas are not used to mark the start and finish of the quotation. A full stop is placed as final punctuation after the bracket containing the source of the quotation.
34. In the case of quotations in which words/sections are omitted, omissions are indicated by an ellipsis in square brackets: [...]. This symbol is followed by a capital letter, unless only part of a sentence is omitted. If a capital letter does not appear at this point in the quoted work (e.g. because it is not the beginning of a sentence), the first letter is enclosed in square brackets.
35. In references to sources of which the author and editor are unknown, the name of the publisher (in articles in English the name of the publisher must in this case be translated into English) and the year of publication of the work are cited. For data published by the Statistics Office of the Republic of Slovenia, for example, the citation should be as follows: (Statistics Office of the Republic of Slovenia, 2007). Abbreviations may also be used for sources, e.g. SURS for the Statistics Office of the Republic of Slovenia, but the name of the source must first be given in full in the text of the article, followed by an explanation that from this point on an abbreviation, which must be specified, will be used for this source. For the above example (Statistics Office of the Republic of Slovenia, 2007), further references to it will use (SURS, 2007).
36. When citing laws in the text, the name of the law, the number of the Official Journal of the Republic of Slovenia and the year shall be given, where the abbreviation OJ RS shall be used for the Official Journal of the Republic of Slovenia, for example: (Cultural Heritage Protection Act, OJ RS, No 16/2008). When quoting directly from laws, the page number in the OJ RS is added.
37. If laws have official abbreviations, for example ZVKD-1, these may be used, but the name of the law must first be given in full in the text of the article, followed by an explanation that from this point on an abbreviation, which must be specified, will be used for this source.

LIST OF REFERENCES

38. All works (sources and references) cited in the article must be listed in alphabetical order at the end of the article in a section entitled References. The list of authors must not be numbered or otherwise labelled (with bullets, dashes, etc.). In the case of the citations shown below, the punctuation marks and font style (italic or regular) are given exactly as they must

be given by the author in his/her article.

Monographs and books (single author)

Fister, P. (1986): *Umetnost stavbarstva na Slovenskem*. Ljubljana, Cankarjeva založba.

Note: Author's surname name, Author's initial(s). (year of publication): *Title: Subtitle if any*. Place of publication, Publisher.

Monographs and books (three to six authors)

Pernet, L., Carlevaro, E., Tori, L., Vietti, G., Della Casa, P., and Schmid-Sikimič, B. (2006): *La necropoli di Giubiasco (TI): Vol. II, Les Tombes de La Tène finale et d'époque romaine*, Collectio archaeologica 4. Zurich, Swiss National Museum.

Note: If there are six or fewer authors, all authors are listed in the list of references. If there are more than six authors, the first six are given and then the abbreviation 'et al.'

Monographs and books (authors not known, editor known)

Dromgoole, S. (ed.) (2006): *Legal Protection of the Underwater Cultural Heritage: National Perspectives in Light of the UNESCO Convention 2001*. Leiden, Martinus Nijhoff.

Undergraduate theses, master's theses, doctoral dissertations, research reports

Uhač, M. (2003): *Brodolom na rtu Savudrija*. Undergraduate thesis. University of Zadar.

Verbič, T. (2008): *Poročilo o ogledu arheoloških izkopavanj na lokaciji NUK 2*. Research report. Ljubljana, Zavod za varstvo kulturne dediščine Slovenije, Območna enota Ljubljana.

Papers or chapters in monographs, books, encyclopaedias and proceedings of conferences, conventions, seminars, etc.

Dumont, A. (2000): *Etat d'un cours d'eau à la fin du 18e siècle : la visite de la rivière d'Ourthe (Belgique)*. In: Bonnamour, L. (ed.): *Archéologie des fleuves et des rivières*, 25–27. Paris, Éditions Errance.

Note: In the case of proceedings of conferences, conventions, seminars, etc., the author does not state the name of the conference, convention, seminar, etc. or where and when it took place. The title of the book, monograph or proceedings is given in italics.

Papers in monographs published in a series with its own title

Svetličič, V. (1997): *Drobne najdbe iz kovine, jantarja in roževine*. In: Horvat, J.: *Sermin*. Opera Instituti Archaeologici Sloveniae, 3, 31–38. Ljubljana, Založba ZRC.

Note: the title of the book is followed by the title of the series and the number of the volume (if the collection is numbered). Numbering is always given in Arabic numerals even if Roman numerals are used in the book. The volume designation (*Band, Heft, Vol., No* etc.) before the number is also omitted.

Articles in periodicals

Delak Koželj, Z. (2008): *Programski model delovanja etnologa konservatorja. Varstvo spomenikov*, 44, 256–262.

Raban, A. (1992): *Archaeological Park for Divers at Sebastos and Other Submerged Remnants in Caesarea Maritima. International Journal of Nautical Archaeology*, 21(1), 27–35.

Note: the numeral 21 in 21(1) refers to the year of publication while the numeral 1 is the number of the issue in that year. If the publication does not have an issue number (for example a single annual publication), the author merely gives the number referring to the year of publication, but not in brackets. Names of publications must not be given in abbreviated form and must be given in italics.

Entries in encyclopaedias and lexicons

Slovenski biografski leksikon, s. v. 'Turner Pavel'. Ulčar, M. (1995): *Enciklopedija orožja: Orožje skozi sedem tisočletij*. Ljubljana, Državna založba Slovenije, s. v. 'Enostrelne zadnjače'.

Note: when citing entries from well-known encyclopaedias and lexicons, only the title (in italics) and the edition (in the case of there being more than one) are given. It is not necessary to state the volume number or the place and year of publication. The title is followed by the abbreviation s.v. (from the Latin *sub verbo* meaning under the word or heading) and the cited entry in inverted commas. Italics are not used for the cited entry.

When citing information from a less well-known lexicon or encyclopaedia, the reference must of course include all the information given in the case of

monographic works.

Articles in daily newspapers

Petkovšek, J. (2009): *Potrebujemo zakon, ne le odlok. Delo*, 51(24), 30. 1. 2009, 9.

Laws

Protection of Cultural Heritage Act. OJ RS, No 16/2008. Ljubljana.

Publications of which the author and editor are unknown – for example statistical sources, encyclopaedias, atlases

Statistics Office of the Republic of Slovenia (2007): *Statistični letopis 2007*. Ljubljana.

Note: the publisher is given first, followed by the year of publication, the title of the work and the place of publication. In articles in English, the name of the publisher and the title of the work must be translated into English in this case.

Unpublished manuscripts and typescripts of which the date of writing is known

Plesničar-Gec, L. (2000): *Emonski teater*. Typescript.

Note: the name of the author of the manuscript/typescript is given first, followed by the date of writing, the title and an indication that it is a manuscript/typescript.

Unpublished manuscripts and typescripts of which the date of writing is not known

Snoj, D. (1999): *Poročilo o zaščitnih izkopavanjih na lokaciji NUK II*. Typescript (received 24. 1. 1999).

Note: the name of the author of the manuscript/typescript is given first, followed by the date (in this case the year that the author of the article received the source), the title, an indication that it is a manuscript/typescript, and in brackets are the exact date on which the work was received.

Interviews, conversations

Svetina, T. (1995): *Marijina kapelica na Mlinem pri Bledu* (personal source 25. 3. 1995).

Note: the reference consists of the name of the interviewee, the year of the interview and, as a title, the content of the interview. The exact date of the interview/conversation is given in brackets.

General remarks

- If a work is still in the process of being published, use the wording 'in press' in brackets instead of the year of publication – this is also the way to cite the work in the text.
- If there is more than one place of publication, the author must cite at least one of them.
- If the publisher is a university faculty or a department thereof, following the place of publication the name of the university must be given first, followed by the faculty and then the department if applicable.
- If there are two or more authors, the reference in the list of references at the end of the article always starts with the author cited (first) in the text.
- If the same author appears both as the sole author of a work and as the first author in a group of authors, the works of which he/she is sole author appear before the group works in the list of references; the latter are arranged alphabetically by the surname of the second author (or if necessary the third). If the same author appears several times, works are cited by year of publication – starting with the oldest.
- If the title of a cited work is in two or more languages, or if the entire article is in two or more languages, the author must add the titles of the work in the other language (or other languages) in square brackets after the title in the first language. If there are several of these titles, they must be separated by a slash (/) without spaces. If a bilingual or multilingual article in a publication is published in more than one place, the page numbers must be given for each separately, as shown in the example below: Horvat, J. (2002): *The Hoard of Roman Republican Weapons from Grad near Šmihel* [Zaklad rimskega republikanskega orožja z Gradu pri Šmihelu pod Nanosom]. *Arheološki vestnik*, 53, 117–150 [150–192].
- Page numbers are separated by an unspaced dash; authors should be careful to use a dash (–) and not a hyphen (-).
- Every reference must end with a full stop.

39. When citing archive sources it is necessary to give the name of the archive

or an abbreviation thereof, the name of the collection and its call number, the number of the unit (folder or box) and the title and number of the cited document, all separated by commas. It is also a good idea to cite, where possible, details that appear on the cited archive material, for example the number and date of publication of a document.

Example of a reference to an archive source

Arhiv Republike Slovenije (ARS), Vicedomski urad za Kranjsko, AS 1, Box 1, Document 942.

40. Internet sources are cited as shown below. The reference should always end with the date of retrieval (the date on which the source was accessed on the web).

Example of a reference to an internet source where the author is known

Avramov, D. (2006): *Social exclusion and social security*. <http://www.avramov.org/documents/document7.pdf> (retrieved on 20. 2. 2008).

Example of a reference to an internet source where the author is not known

Internet 1: <http://www.international.icomos.org/charters.htm> (retrieved on 15. 9. 2008).

Note: in the first case the in-text citation will be: (Avramov, 2006); and in the second case (internet 1, 2,...).

41. The list of references should only include works that are actually cited in the text of the article. Each item in these lists is concluded by a full stop.

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Zavod za varstvo kulturne dediščine Slovenije
Varstvo spomenikov – Editorial office
Poljanska cesta 40
SI-1000 Ljubljana

43. Illustrations must be saved in their final form in a folder which is separate from the text of the article. Do not send material by e-mail but write it onto a CD. Enclose a hard copy of all the files with the CD.

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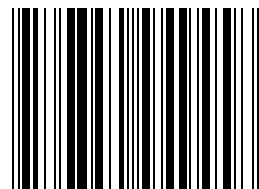
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