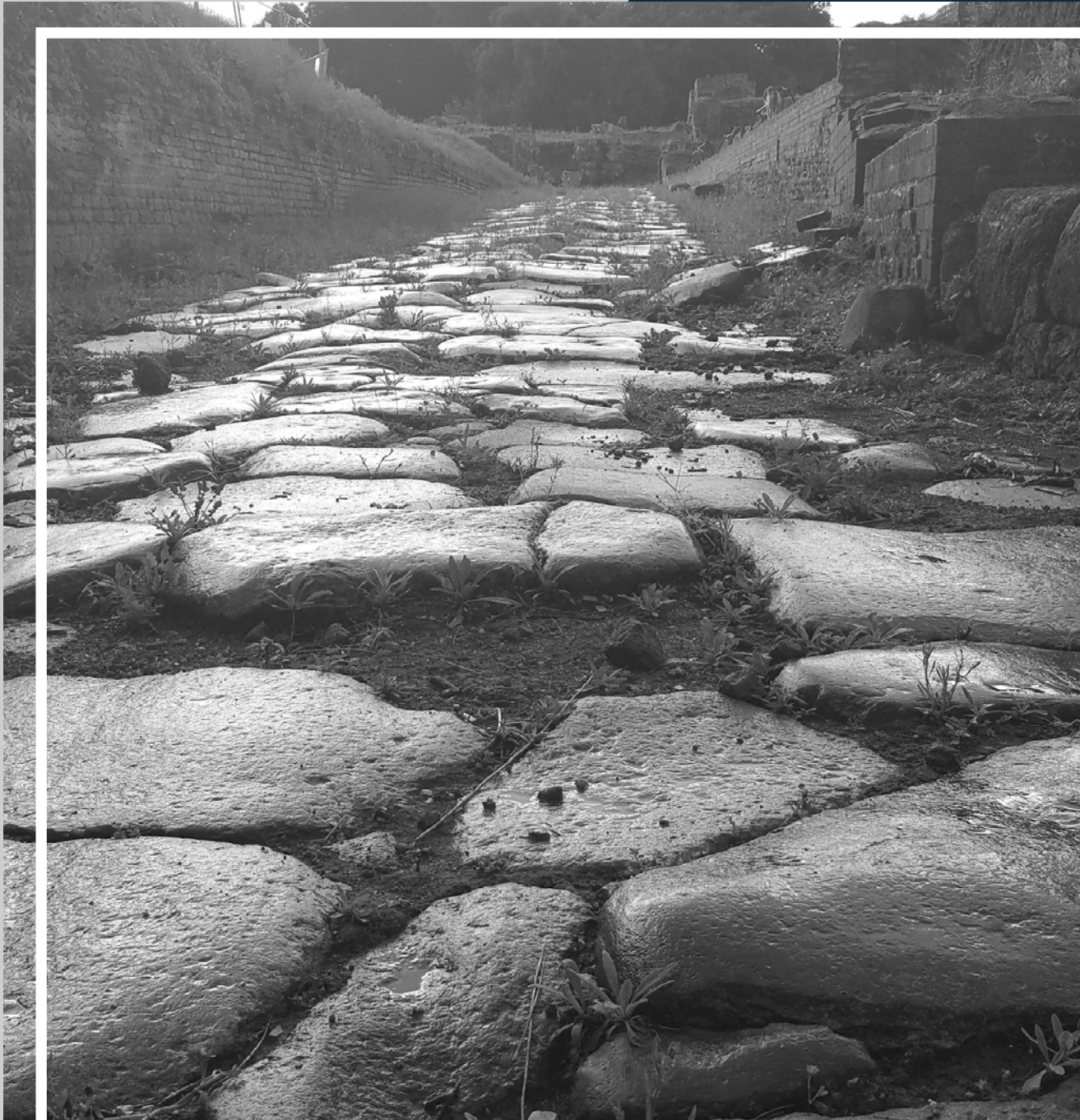


VOL. 3-4 | 2024-2025

ARCHEOLOGIE

TRA ORIENTE E OCCIDENTE

CENTRO
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L'ORIENTALE

Archeologie tra Oriente e Occidente 3-4/2024-2025

ISSN 2974-7651



UniorPress

Archeologie tra Oriente e Occidente is an Open Access and double-blind peer review annual online journal - <http://serena.unina.it/index.php/cssaunior>



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Edited by UniorPress
Università di Napoli L'Orientale
Palazzo del Mediterraneo - Via Nuova Marina 59, 80133 Napoli
uniorpress@unior.it

Pagine 89 + covers; Dimensioni 21×29,7 cm

ISSN 2974-7651

Archeologie tra Oriente e Occidente

DOI: <https://doi.org/10.6093/archeologie/2024/3>

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In copertina: Strada romana presso Parco archeologico di Cuma - elaborazione foto Rosario Valentini

Indice

<i>Giovanni Borriello</i>	
Cupra Marittima: Nota preliminare sulla circolazione del materiale ceramico dell'area del Foro	1-6
<i>Matteo D'Acunto, Marco Capurro, Chiara Improta, Cristina Merluzzo, Francesco Nitti, Mara Soldatini</i>	
Gli scavi dell'Università di Napoli L'Orientale nel villaggio pre-ellenico e nell'abitato greco-romano di Cuma: le campagne del 2024 e del 2025	7-23
<i>Marco Giglio</i>	
Le ricerche presso la villa imperiale del Pausilypon nel 2025	25-29
<i>Roberta Giunta, Alexia Pavan, Rosario Valentini, Amanda Antonelli</i>	
Food, Fire, and Ovens: New Archaeological Discovery at Al Baleed by the Italian Archaeological Mission (2024 Season Report)	31-43
<i>Romolo Loreto, Lucio Anwar Corrado, Alessia Vitale, Benedetta Musella, Mattia Cozzolino, Rosanna Marchese, Clémence Martinelli, Carlotta Russo, Ibrahim al-Maqbqli, Michela Musto</i>	
2024 Season of the University of Naples L'Orientale at Wādī Banī Khālid. From the Excavation to Conservation and Valorisation	45-60
<i>Andrea Manzo, Luisa Sernicola, Domenico Filosa</i>	
Digital Tools for Heritage Protection and Conservation in Conflict Prone Areas: A Glympse from Northeastern Africa and Horn	61-77
<i>Alexia Pavan</i>	
A Mosque at Khor Rori, New Evidence for the Islamic Period in Coastal Dhofar	79-89



Cupra Marittima: nota preliminare sulla circolazione del materiale ceramico dall'area del Foro

Giovanni Borriello
Università di Napoli L'Orientale

Abstract

La nota presenta i risultati preliminari delle attività svolte durante la campagna di ricerche del 2025 presso l'area del Foro dell'antica Cupra Marittima. Oltre all'analisi dei materiali provenienti dagli scavi 2022-2024 è stata svolta una revisione dei rinvenimenti effettuati in prossimità del podio del tempio tra il 2000 e il 2002. L'analisi sistematica ha preso in esame circa 5000 frammenti ceramici, rappresentativi delle principali classi tra età tardo-repubblicana e periodo moderno. I contesti mostrano una forte concentrazione di materiali tra il I e gli inizi del II sec. d.C., con netta prevalenza di produzioni italiane e locali, soprattutto anfore adriatiche (Dressel 6A-B) e ceramiche comuni. Le importazioni risultano limitate nelle fasi alto imperiali, mentre diventano più significative in età tardoantica, con arrivi dal nord Africa e dall'area egeo-orientale (LRA 1 e 3). I dati confermano l'inserimento di Cupra in dinamiche commerciali prevalentemente adriatiche, con una circolazione a lungo raggio più selettiva ma continuativa fino alla tarda antichità. L'indagine costituisce un primo quadro interpretativo, in vista di ricerche future estese anche all'intero settore costiero.

Keyword: Cupra Marittima, ricerche e scavi, ceramica romana

Citation: Borriello, G., Cupra Marittima: nota preliminare sulla circolazione del materiale ceramico dall'area del Foro, *Archeologie tra Oriente e Occidente*, vol. 3-4, pp. 1-6 <https://doi.org/10.6093/archeologie/13088>

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Nel periodo compreso tra giugno e luglio 2025 si è svolta una nuova campagna di ricerca archeologica presso il Parco Archeologico-Naturalistico “La Civita” di Cupra Marittima (AP),¹ promossa dal Comune di Cupra Marittima² e condotta sotto la direzione scientifica dell'Università di Napoli L'Orientale.³ L'attività si è configurata come scavo-scuola,⁴ offrendo agli studenti l'opportunità di partecipare in prima persona alle diverse fasi dell'analisi archeologica.⁵ Le attività hanno coinvolto i partecipanti nella revisione e nella schedatura preliminare dei materiali provenienti dalle precedenti campagne (2022–2024),⁶

¹ Per una conoscenza generale del contesto cuprese si rimanda alla recente sintesi proposta da Fabrizio Pesando (2023).

² Si ringrazia il sindaco Alessio Piersimoni e tutto lo staff comunale per il costante sostegno alle attività di ricerca e nel corso delle aperture al pubblico, nonché la SABAP AP-FM-MC, nella persona del Soprintendente Arch. Giovanni Issini e del funzionario dott. Francesco Pizzimenti, per il costante dialogo e supporto.

³ La direzione scientifica del Parco Archeologico-Naturalistico di Cupra Marittima è stata affidata, fino al 2023, al compianto prof. Fabrizio Pesando, a cui sono grato per essere stato un costante punto di riferimento nel corso dei miei studi. Attualmente, la direzione è affidata al dott. Marco Giglio, che ringrazio sinceramente per la fiducia e le opportunità che mi ha accordato in questi anni.

⁴ La ricerca ha beneficiato del contributo del Dipartimento Asia, Africa e Mediterraneo (DAAM) e dei fondi dell'ex CISA (Centro Interdipartimentale per i Servizi di Archeologia), oggi BiMA, sezione *Digital Humanities*. Si ringraziano la direttrice del DAAM, prof.ssa Roberta Giunta, e la prof.ssa Maria De Vivo, presidente della sezione *Digital Humanities*, per il sostegno alla ricerca e per il contributo offerto alla sua realizzazione.

⁵ Alla campagna di scavo ha preso parte chi scrive, in qualità di coordinatore delle attività, coadiuvato dalla dott.ssa Ilaria Di Tano. Fondamentale è stato inoltre il contributo degli studenti dei Corsi di Studio triennale e magistrale in Archeologia: Marco Aprea, Francesca Cangiano, Salvatore Colella, Zelinda Cozzolino, Francesco Friscia, Maria Pia Iannucci, Evaluna Soligno, Stella Sorrentino, Flavio Ventre, Gaia Vitiello.

⁶ Sulle campagne di ricerca precedenti si rimanda a Pesando *et alii* 2023, pp. 189-262; Di Tano 2024, pp. 1-3.

consentendo loro di maturare un'esperienza diretta nella documentazione e nello studio dei reperti. L'analisi ha previsto tutte le fasi operative, dal lavaggio alla catalogazione dei materiali, nonché la loro riproduzione grafica e fotografica, garantendo un approccio completo alla ricerca archeologica. Nel corso delle due settimane di attività (29 giugno - 13 luglio 2025), gli studenti hanno approfondito lo studio delle principali classi di materiali rinvenute nei contesti del Foro di Cupra Marittima, e hanno apportato un contributo alla ricostruzione delle dinamiche produttive e commerciali del circuito medio-adriatico in età antica.

Questa breve nota, oltre a costituire una comunicazione sulle attività condotte durante l'ultima campagna, intende porre l'accento su alcune problematiche di natura socioeconomica che, sebbene già affrontate in passato (Fortini 1993), necessitano oggi di una rilettura alla luce dei più recenti risultati di ricerca.

Le aree oggetto di ricerca

Le aree di scavo oggetto di studio nel corso dell'ultima campagna sono soprattutto saggi realizzati in prossimità e all'interno della cella dell'edificio templare, situato sul lato occidentale della piazza forense (saggi 6, 7, 8, 9, 10, 11 e 12).⁷ Accanto a questi, sono state oggetto di revisione anche le evidenze provenienti dal saggio EQ 1, localizzato nei pressi dell'accesso settentrionale all'area del Foro.

Il palinsesto cronologico restituito dai contesti indagati risulta particolarmente articolato, con attestazioni comprese tra il III secolo a.C. e l'età moderna. All'interno di questo ampio arco temporale, si distinguono in modo netto i livelli riferibili al periodo compreso tra l'età augustea e il II secolo d.C., che sembrano confermare le cronologie preliminari già proposte sulla base dei criteri stilistici e decorativi dei materiali.

Oltre ai reperti emersi durante le campagne di scavo condotte dall'Università di Napoli L'Orientale, sono stati presi in esame i materiali e le evidenze provenienti dai saggi effettuati nell'ambito delle ricerche degli anni 2000-2002, al fine di integrare e ampliare il quadro delle conoscenze dell'area forense di Cupra Marittima.

Analisi del materiale ceramico

L'analisi svolta ha preso in esame un totale di 8331 frammenti, associabili a numerose classi di materiali.⁸ Tra questi, i reperti ceramici sono circa la metà (4071 frammenti, riconducibili ad almeno 478 esemplari) e coprono un arco cronologico piuttosto ampio, che va dall'età tardo-repubblicana a quella moderna. Il grosso dei rinvenimenti, tuttavia, resta circoscritto alla piena età imperiale. Tra i vari reperti quelli maggiormente significativi sono le anfore, le quali costituiscono il 43,7% del totale dei frammenti ceramici rinvenuti. Il secondo gruppo più numeroso è costituito dalle ceramiche comuni (37,4%), seguono la terra sigillata (3,9%), le pareti sottili (2,9%) e le lucerne (2,5%), mentre la vernice nera è presente solo con lo 0,2% del totale dei reperti.

In merito ai contenitori da trasporto, è evidente la prevalenza di prodotti realizzati in area adriatica, tra i quali prevalgono soprattutto il tipo Dressel 6, sia nella variante 6A che 6B (Figg. 1.1-2), seguita con numeri decisamente più ridotti dalle Dressel 2-4 adriatiche e almeno due anfore di Grado I (Fig. 1.3),

⁷ Una prima analisi delle ceramiche fini (vernice nera, terra sigillata, pareti sottili) e del vasellame per illuminazione dai saggi 6, 7 e 8 si deve allo studio condotto dal dott. Mattia Guida nel corso della sua tesi magistrale discussa presso l'Università di Napoli L'Orientale (a.a. 2021-2022), con relatore il prof. Fabrizio Pesando e correlatore il dott. Marco Giglio.

⁸ Tra le classi più attestata sono da sottolineare soprattutto gli elementi architettonici del tempio (in calcare) e delle coperture (laterizi). Per quanto concerne le numerose attestazioni epigrafiche rinvenute sui laterizi si vedano Fortini 1984 e Fortini 1993, 131-133. L'analisi degli elementi architettonici è parte integrante del progetto di dottorato di ricerca della dott.ssa Ilaria Di Tano (Università di Napoli L'Orientale), ciclo XXXVIII.

dall'Adriatico settentrionale. Un ultimo esempio, noto tuttavia da un solo esemplare, è da ricondurre alle anfore di Portorecanati, diffuse tra la metà del I e il II sec. d.C. Molto scarse sono le importazioni dall'area tirrenica, le quali compaiono sporadicamente e con una ridotta varietà; tra queste è possibile citare almeno un'anfora Dressel 2-4 di produzione vesuviana. Per quanto concerne le importazioni provinciali, è possibile evidenziare un gruppo di contenitori dal Nord Africa, noti soprattutto con i tipi Africana IIB e IIIA (Figg. 2.4-5). Molto sporadiche risultano essere anche le anfore dall'area cretese, presenti soltanto con due anse associabili ai tipi Cretese 1 e Cretese 4. Nei livelli più tardi di frequentazione è possibile riscontrare un discreto numero di prodotti di importazione egeo-orientale. Tra questi va citato un puntale di anfora LRA 3, nella sua fase iniziale, e alcune anfore LRA 1, nelle varianti 1A (Fig. 3.6) e 1B (Fig. 3.7).

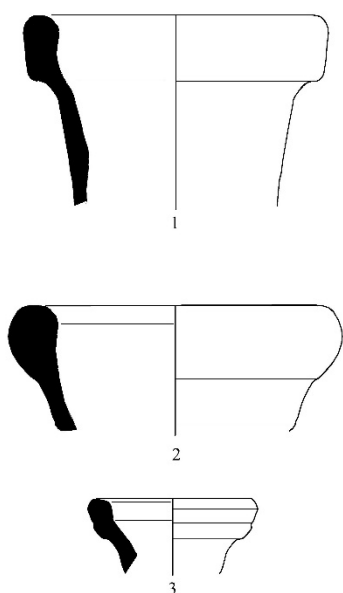


Fig. 1 - Anfore di produzione adriatica (disegni a cura di: 1 Gaia Vitiello; 2 Salvatore Colella; 3 Zelinda Cozzolino)

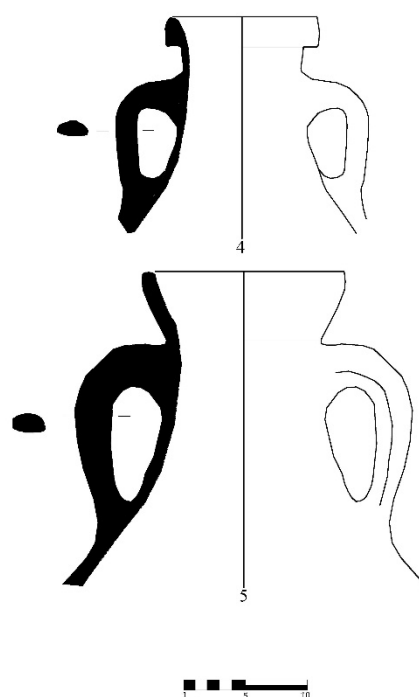


Fig. 2 - Anfore di produzione africana (disegni a cura dell'autore)

Come per le anfore, anche tra le ceramiche di uso comune si riscontra prevalentemente un repertorio locale, con rarissime importazioni di prodotti africani e orientali, note soprattutto nei contesti più tardi. Tra le attestazioni locali prevalgono le olle e le pentole con orlo estroflesso (Figg. 4.8-9) e, in una fase piena e tardo-imperiale, si diffondono le pentole con orlo introflesso e riseghe esterne (Fig. 4.10). Le forme più diffuse tra i prodotti di tradizione africana sono le casseruole Hayes 197 (Fig. 4.11) e i coperchi Hayes 196 (Fig. 4.12). Passando al repertorio orientale, sono da citare pentole con decorazione a rotella sulla spalla, anch'esse note nel corso del II e III sec. d.C. Nel repertorio delle ceramiche comuni, vanno inoltre annoverate le ceramiche a vernice rossa interna, note soprattutto con tegami, di solito di non grandi dimensioni, con impasti piuttosto ricchi di inclusi micacei.

L'analisi della ceramica fine a vernice nera ha messo in evidenza una netta prevalenza di prodotti di ambito etrusco, mentre le produzioni di area centro-italica e adriatica risultano rappresentate in misura più limitata. Dal punto di vista morfologico, il repertorio è dominato dai piatti, in particolare dagli esemplari riconducibili alla serie Morel 2272 (Fig. 5.13), cui si affiancano, con frequenze più contenute, i piatti del tipo Morel 1173.

Sebbene la vernice nera sia attestata anche nei livelli di piena età augustea, è possibile riscontrare una circolazione piuttosto precoce della terra sigillata. Per questa classe ceramica è stato possibile individuare sia produzioni di area etrusca, che dell'area centro-italica, alle quali si associano manufatti di provenienza padana e di ambito medio-adriatico.

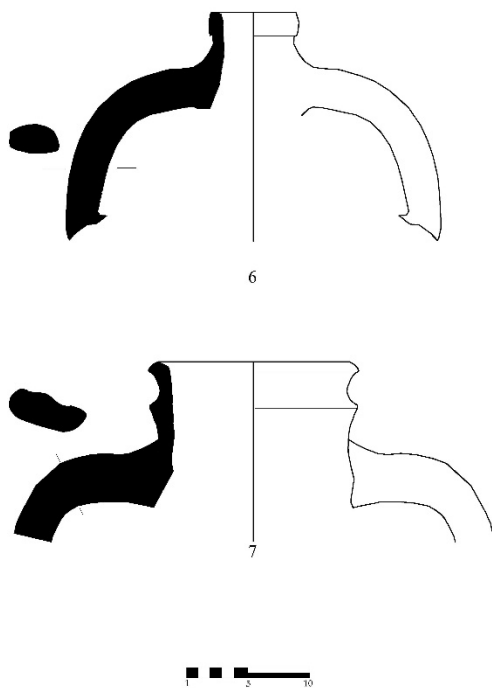


Fig. 3 - Anfore di produzione egeo-orientale (disegni a cura di: 6 dell'autore; 7 Francesco Friscia)

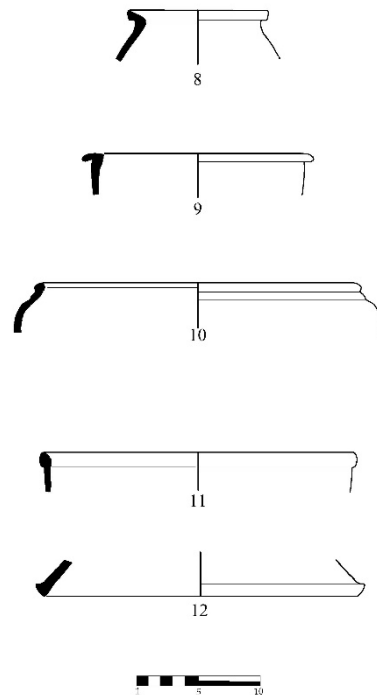


Fig. 4 - Ceramiche comuni (disegni a cura di: 8 Gaia Vitiello; 9 Maria Pia Iannucci; 10 Zelinda Cozzolino; 11 Francesco Friscia; 12 Francesca Cangiano)

Passando all'analisi del repertorio morfologico, si rileva una maggiore presenza di forme aperte, costituite in prevalenza da piatti. Tra questi prevalgono le forme medio-augustee, quali i piatti *Conspectus* 12 e 18 (Fig. 5.14). A tale repertorio si possono associare le coppe tronco-coniche *Conspectus* 22 e le coppe emisferiche *Conspectus* 36. Piuttosto rare risultano invece le coppe a listello *Conspectus* 34 e i piatti *Conspectus* 20, attestati da pochi esemplari.

Per le produzioni a rilievo va sottolineata la presenza di almeno tre calici realizzati a matrice, tutti riconducibili a produzioni aretine e morfologicamente riferibili alle forme *Conspectus* R.1.1.1 e R.11 (Figg. 5.15-16). Concludono il quadro delle presenze italiche almeno due coppe di tipo *Sarius* *Conspectus* R.13 (Fig. 5.17), a cui è possibile associare almeno un bicchiere di tipo *Aco*.

Nel novero delle importazioni è possibile notare una scarsa presenza di sigillata orientale B2, attestata soltanto da pochi frammenti di parete, mentre non sembrano, per ora, documentate altre produzioni di area orientale. Più significativo risulta invece l'apporto delle importazioni africane; anche per questi prodotti, tuttavia, le attestazioni note sembrano riferirsi prevalentemente a fasi tarde. La sigillata africana A, ampiamente diffusa nel periodo compreso tra il I e il III secolo d.C., appare scarsamente rappresentata, fatta eccezione per alcuni prodotti iniziali, tra cui un piede riconducibile a un boccaglio Hayes 171 (Fig. 5.18). Diverso è il discorso relativo ai prodotti tardi in sigillata africana C e D. Per quanto riguarda le produzioni ascrivibili al gruppo C, le attestazioni si riferiscono soprattutto alla produzione C2, associabile prevalentemente alla diffusissima forma Hayes 50 (Fig. 5.19). In merito alla più tarda produzione D, sono noti una coppa Hayes 86 (Fig. 5.20), rinvenuta in prossimità dell'arco meridionale e almeno due esemplari di coppe a listello Hayes 91 (Fig. 5.21), entrambi emersi nel corso degli scavi del 2002.

Per quanto concerne il repertorio delle pareti sottili, si riscontra un numero limitato di forme, per la maggior parte riferibili a produzioni di ambito centro-italico e riconducibili, in buona parte, alla coppa emisferica Marabini XXXVI (Fig. 6.22). Più rare appaiono le attestazioni di area padana, mentre risultano quasi del tutto assenti le importazioni extra-peninsulari.

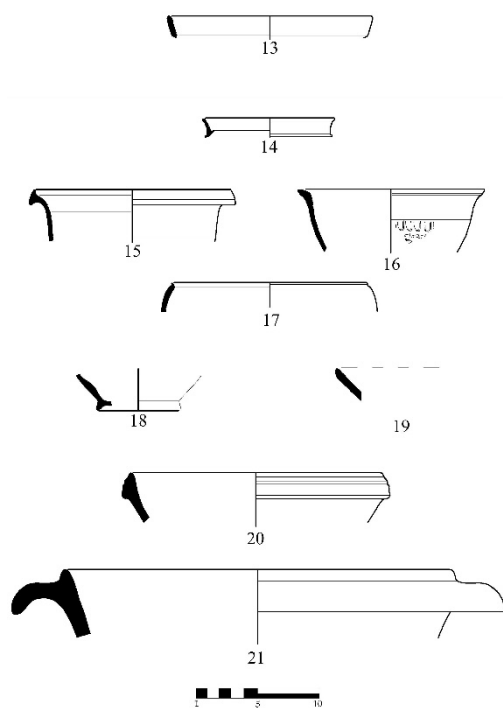


Fig. 5 - Ceramiche fini (vernice nera e terra sigillata) (disegni a cura di: 13 Evaluna Soligno; 14 Francesco Friscia; 15 Flavio Ventre; 16 autore; 17 Evaluna Soligno; 18 Salvatore Colella; 19 Francesco Friscia; 20 Evaluna Soligno; 21 dell'autore)

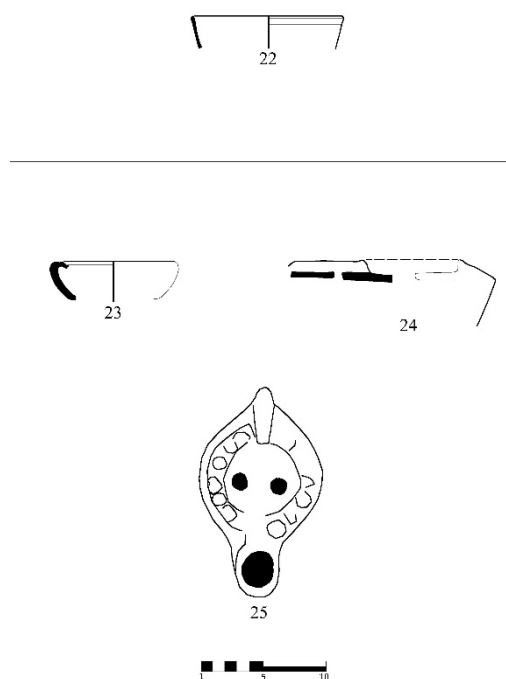


Fig. 6 - Pareti sottili e lucerne (disegni a cura di: 22 Francesco Friscia; 23 Marco Aprea; 24 Stella Sorrentino; 25 dell'autore)

Infine, le lucerne, sebbene poco rilevanti numericamente, sono significative per l'apporto formale. Sono note soprattutto prodotti di area centro-italica e padana. Per quanto concerne il repertorio locale/regionale, prevalgono le lucerne a volute (Fig. 6.23), soprattutto del tipo Dressel 11, e quelle a volute

con becco triangolare, Dressel 9. Dall'area padana è possibile citare le cosiddette "lucerne a canale", circolanti soprattutto tra la fine del I e il III sec. d.C. (Fig. 6.24) Si associano a queste, le più tarde lucerne di importazione africana, tra le quali si può citare un esemplare del tipo Atlante X (Fig. 6.25).

Conclusioni

Il quadro preliminare delineato a seguito della revisione dei materiali provenienti dall'area del Foro dell'antica città di Cupra Marittima consente di formulare alcune prime ipotesi interpretative.

L'analisi dei contesti rinvenuti in prossimità e all'interno del podio del tempio evidenzia una notevole uniformità stratigrafica, con una netta prevalenza di vasellame databile tra il I e gli inizi del II secolo d.C. In tali livelli risultano predominanti i prodotti di produzione italiana, mentre le importazioni appaiono piuttosto sporadiche.

Diversa si presenta la situazione del saggio EQ 1, da cui provengono evidenze riferibili alle fasi più avanzate dell'età imperiale e ai primi segnali della transizione al tardoantico. I materiali più recenti, rinvenuti negli strati superficiali indagati durante gli scavi 2000-2002, testimoniano la presenza di importazioni africane, in particolare anfore e terra sigillata di piena età tardoantica. A queste si aggiungono reperti di epoca moderna, che sembrano indicare una rioccupazione dell'area a carattere agricolo-residenziale.

Per quanto riguarda i circuiti commerciali che interessarono Cupra in età storica, i dati suggeriscono l'esistenza di rapporti privilegiati con l'area adriatica, sia meridionale che settentrionale. Le importazioni di anfore dall'area brindisina, assieme alla circolazione di ceramiche fini e lucerne provenienti dalla pianura padana, testimoniano la vitalità dei circuiti regionali e locali almeno per tutta la prima e media età imperiale.

La circolazione a lungo raggio appare invece più limitata, ma comunque documentata, in particolare per le fasi tardoantiche, con rapporti commerciali che coinvolgono le coste nordafricane e, con maggiore intensità, l'area egeo-orientale, come dimostrato dalla presenza di anfore da Creta e dall'area egeo-orientale. Durante la dominazione bizantina, si registra infine la diffusione delle anfore di tipo Late Roman 1 e 3, che attestano la persistenza dei contatti con il Mediterraneo orientale anche in epoca tardoantica.

Questa breve sintesi si pone l'intento di costituire solo una nota preliminare su un argomento tanto interessante quanto complesso, che si spera di poter ampliare con successive ricerche sistematiche, che possano tenere conto sia dell'area forense che delle diverse ville marittime dislocate lungo la costa.

BIBLIOGRAFIA

Di Tano, I. (2024) Cupra Marittima. Campagna di scavo 2023. *Archeologie tra Oriente e Occidente* 2, pp. 1-3.

Fortini, P. (1984) I laterizi bollati di 'Cupra Marittima'. Apporti alla storia economica della città picena. *Picus* IV, pp. 107-134.

Fortini, P. (1993) Cupra Marittima: aspetti di vita economica attraverso la documentazione storica e archeologica, in G. Paci (a cura di), *Cupra Marittima e il suo territorio in età antica* (Atti del Convegno di Studi a Cupra Marittima, 3 maggio 1992), pp. 83-181. Tivoli.

Pesando, F. (2023) *Cupra Marittima. Guida al parco archeologico* (Approfondimenti del parco archeologico-naturalistico di Cupra Marittima 1).

Pesando, F., M. Giglio, S. Antolini, M. Capurro, D. Garzillo, C. Mattei, (2023) Ritorno a Cupra. Scavi stratigrafici nel tempio del Foro e nuovi dati sulla messa in opera dell'*opus reticulatum* nel I sec. d.C., *Picus* XLIII, pp. 189-262.

Gli scavi dell'Università di Napoli L'Orientale nel villaggio pre-ellenico e nell'abitato greco-romano di Cuma: le campagne del 2024 e del 2025

Matteo D'Acunto, Marco Capurro, Chiara Improta, Cristiana Merluzzo, Francesco Nitti, Mara Soldatini
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Abstract

This paper outlines the results of the 2024 and 2025 excavation campaigns conducted by the University of Naples L'Orientale in Cumae in the Pre-Hellenic village and the Greek-Roman city, in the area north of the Forum Baths. In particular, it presents the excavation of a Pre-Hellenic hut with related finds (780-750 BC), a street whose phases are important to define the transformation in the urban layout of the district from the Greek to the Roman periods, and a Roman-era metalworking workshop.

Keywords: Cumae, Pre-Hellenic village, Greek colonization, Roman period, urban layout, metallurgy

Citation: D'Acunto, M. *et al.* Gli scavi dell'Università di Napoli L'Orientale nel villaggio pre-ellenico e nell'abitato greco-romano di Cuma: le campagne del 2024 e del 2025, *Archeologie tra Oriente e Occidente*, vol. 3-4, pp. 7-23
<https://doi.org/10.6093/archeologie/13089>

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Quadro d'insieme e interventi di scavo del 2024 e del 2025 (M. D'Acunto)

Lo scavo archeologico dell'Università di Napoli L'Orientale a Cuma, diretto da Matteo D'Acunto, a partire dal 2007 si concentra nel settore dell'abitato greco-romano, ubicato nella piana antistante l'acropoli e compreso tra le Terme del Foro e le mura settentrionali, a Est della porta mediana (Figg. 1-2). Lo scavo si svolge in regime di concessione dal Ministero della Cultura e in stretta collaborazione col Parco Archeologico dei Campi Flegrei.¹ Il lavoro sul campo è condotto ogni anno, in una campagna della durata di un mese, con la formula dello scavo-scuola, che prevede la partecipazione attiva di diverse decine di studenti dell'Orientale e di altre università a tutte le fasi della ricerca: dallo scavo vero e proprio, all'elaborazione della documentazione cartacea, grafica e informatica, al primo trattamento e alla classificazione dei reperti, fino ad arrivare all'interpretazione delle evidenze. Nelle campagne del 2024 e del 2025, sui cui risultati e sulle cui attività si concentra il presente contributo, i saggi di scavo e il lavoro di magazzino sono stati coordinati da Marco Capurro, Chiara Improta, Cristiana Merluzzo, Francesco Nitti e Mara Soldatini.

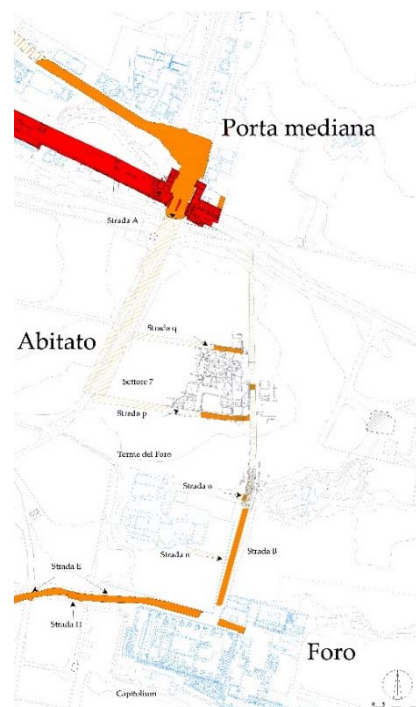


Fig. 1 - Pianta della parte settentrionale della città (© Università di Napoli L'Orientale)

¹ Ringraziamo il Direttore, Fabio Pagano, le funzionarie archeologhe, Marzia Del Villano e Marialaura Iadanza, e l'assistente di scavo, Cesare Giordano, per il prezioso e costante sostegno alla nostra ricerca.

Il nostro scavo, condotto al tempo stesso in estensione e in profondità, ha documentato, in questo settore del sito antico, una stratificazione pressoché continua di tutte le fasi principali di occupazione dell'insediamento di Cuma: dalla fase pre-ellenica (D'Acunto *et al.* 2021, 305-386; D'Acunto in *st. a.*), alla città di epoca coloniale greca,² sannitico-campana e romana (Giglio 2022; Iavarone 2016 e 2023), fino ad età tardo-antica e oltre, comprese le evidenze riconducibili alla presenza nell'area di un accampamento alleato della II Guerra mondiale (D'Acunto *et al.* 2022, 90).

Per la fase pre-ellenica, le importanti novità degli ultimi anni, scaturite dallo scavo a Nord delle Terme del Foro, si riferiscono sia alla fase della Tarda Età del Bronzo che a quella dell'Età del Ferro, in entrambi i casi relative a evidenze inequivocabili di strutture a carattere abitativo. Per l'Età del Bronzo l'evidenza portata alla luce consiste in diverse serie di buche di palo riferibili a capanne e/o ad altre strutture lignee, a cui sono associati reperti ceramici, tra cui anche un frammento miceneo (D'Acunto *et al.* 2021, 316-325 e D'Acunto *et al.* 2022, 76). Particolarmente importante, per le condizioni di giacitura e la rarità del rinvenimento di un'abitazione del Primo Ferro in Campania, è la capanna databile alla fine della fase pre-ellenica (ca. 780-750 a.C.; D'Acunto *et al.* 2021, 332-386 e D'Acunto in *st. a.*). Si segnala il rinvenimento nel settore dell'abside di un ricco *set* funzionale alla preparazione del cibo, costituito da fornelli, un forno mobile e vasi per la cottura, insieme a ceramica fine, che documenta le pratiche alimentari e il consumo delle bevande. Tali pratiche andavano, certamente, ben al di là della dimensione della sussistenza, implicando delle forme cerimoniali che inserivano il gruppo familiare in una rete di relazioni sociali con l'*élite* locale e con mercanti euboici e sardo-fenici; questi ultimi dovevano frequentare intensamente il sito in questo orizzonte cronologico, immediatamente precedente la fine del villaggio pre-ellenico. Ciò è ben documentato dal rinvenimento nella capanna e nei suoi dintorni di ceramica sardo-fenicia legata al consumo dei cibi e delle bevande, e soprattutto di ceramica fine greca, nella stragrande maggioranza importata dall'Eubea, funzionale al consumo cerimoniale del vino (*skyphoi* a semicerchi penduli, *black skyphoi*, *skyphos* a *chevrons*, *skyphos* a uccelli).³ La capanna pre-ellenica solleva intriganti interrogativi, in merito alla fine del villaggio indigeno. Nella prospettiva della micro-storia rivelata dalla nostra area di scavo,

la distruzione per incendio della capanna si contestualizza nella generale destrutturazione del villaggio pre-ellenico databile attorno alla metà dell'VIII sec. a.C. (Criscuolo, Pacciarelli 2008; Gastaldi 2018; D'Acunto *et al.* 2021, 376-386) Tale destrutturazione riflette verosimilmente l'inizio del processo coloniale greco, ad

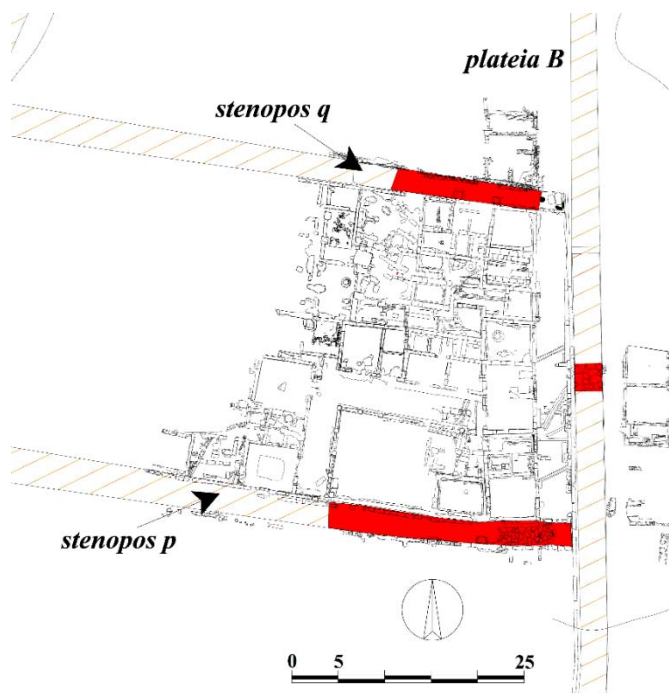


Fig. 2 - Pianta della città antica a nord delle Terme del Foro, scavi dell'Università di Napoli L'Orientale 2007-2025 (© Università di Napoli L'Orientale)

² Si vedano D'Acunto 2017, 298-307, D'Acunto 2020a, D'Acunto 2025a, D'Acunto in *st. a.* Per un quadro d'insieme su Cuma alto-arcaica e arcaica si vedano D'Acunto 2020b, D'Acunto 2022a, D'Acunto 2022b e, soprattutto, D'Acunto 2025b.

³ Si vedano, rispettivamente, Botto 2021; D'Acunto *et al.* 2021, 354-386.

opera di pithecusani ed euboici, processo coloniale che deve aver comportato l'imposizione violenta e la conquista del territorio da parte di questi ultimi a discapito degli indigeni (anche se, naturalmente, non siamo in grado di stabilire quale sia stata la causa specifica che ha portato all'incendio della nostra capanna).⁴

I nostri scavi e l'attento studio dei reperti ceramici hanno confermato la cronologia della primissima fase coloniale di Cuma al Tardo Geometrico I (ca. 750-720 a.C.), più in particolare alla sua fase iniziale (ca. 750-740 a.C.): ciò attraverso le evidenze portate alla luce di lacerti di strutture abitative, che hanno restituito ceramica importata da Pithekoussai, insieme a ceramica corinzia e a poca ceramica euboica (D'Acunto *et al.* 2021, 386-403). Tali evidenze avvalorano l'ipotesi che il processo coloniale di Cuma deve essere iniziato solo poco dopo quello di Pithekoussai (ca. 770-750 a.C.) e aver preceduto, invece, seppur di poco, le prime *apoikiai* greche in Sicilia (a partire da Naxos del 734 a.C., seguita da Siracusa del 733 e dalle altre, in base alle cronologie indicate da Tucidide; D'Acunto *et al.* 2021, 305-316).

Le evidenze del nostro scavo, assieme a quelle più generali del sito di Cuma, confermano che nella generazione successiva (Tardo Geometrico II: ca. 720-690 a.C.) l'insediamento coloniale deve aver conosciuto un importante processo di espansione interna, probabilmente come risultato dell'arrivo di nuovi gruppi di coloni (*epoikoi*): ciò è rivelatore del carattere processuale con cui va vista la "ktisis-fondazione" di Cuma (D'Acunto 2017; D'Acunto 2025b; D'Acunto in st. a). Le abitazioni sono state messe in luce parzialmente al di sotto degli ambienti delle *domus* romane:⁵ esse denotano l'occupazione a carattere abitativo dell'area. Inoltre, si segnala il rinvenimento, nel settore settentrionale dell'area di scavo, di scorie di lavorazione del bronzo e del ferro:⁶ queste documentano la prossimità di forge/botteghe per la lavorazione dei metalli, che dovevano essere poste in prossimità di alcune delle abitazioni; tale quadro archeologico riflette l'associazione diretta abitazione-attività metallurgica che è ben documentata nel cosiddetto quartiere artigianale di Mazzola a Pithekoussai. Tale evidenza di una lavorazione specializzata del bronzo e del ferro *in loco*, ascrivibile all'orizzonte del Tardo Geometrico II (720-690 a.C.) – inizi del Medio Protocorinzio (690-650 a.C.) è documentata anche al di sotto del piano stradale più antico dello *stenopos* q, nel recente scavo condotto nel 2025.

Un evidente salto di qualità nell'organizzazione di questo settore dell'abitato in età coloniale greca è rappresentato dalla messa in opera di un impianto urbano, scandito da una maglia stradale: quest'ultima è costituita da due assi maggiori (*plateiai* A e B) che sono intersecati da una serie di assi minori (*stenopoi* n, o, p, q, insieme verosimilmente ad una via interpomeriale), compresi tra il Foro (dove doveva essere ubicata l'*agorà* di età greca) e le mura settentrionali (Fig. 1).⁷ Tale impianto urbano si presenta parzialmente irregolare negli allineamenti degli assi viari, nei loro incroci e nelle forme degli isolati, per adattarsi al meglio alle curve di livello di questo settore del sito e per determinare, attraverso le pendenze, un razionale smaltimento delle acque reflue lungo gli assi viari verso l'esterno della città (D'Acunto 2020c). Diversi saggi in profondità, condotti nel corso degli anni, sugli *stenopoi* p e q e sulla *plateia* B hanno documentato una sequenza continua di battuti stradali che dal periodo romano imperiale risale in alto nel tempo ad epoca coloniale greca alto-arcaica. È, pertanto, possibile leggere in filigrana, almeno in parte attraverso l'urbanistica romana del quartiere, l'impianto originario di età alto-arcaica: la sua parziale conservazione, per circa mille anni di vita del quartiere, si deve al razionale studio dell'adattamento tra assi stradali, curve

⁴ Per un quadro d'insieme si veda D'Acunto 2025b.

⁵ Si vedano d'Agostino, D'Acunto 2008; D'Acunto 2017, 298-305; D'Acunto 2020a; D'Acunto, Nititi 2023.

⁶ D'Acunto 2017, 301; per aggiornamenti si veda D'Acunto in st. a.

⁷ Sull'urbanistica del quartiere si vedano D'Acunto 2017; D'Acunto 2020a; D'Acunto in st. b.

di livello e pendenze, messo in atto all'epoca in cui fu stabilito l'originario impianto urbano. Cuma si aggiunge, dunque, ai casi ben noti in *poleis* della Sicilia e della Magna Grecia di un'urbanistica di età alto-arcaica solo parzialmente regolare, a partire da quello più conosciuto in estensione di Megara Hyblaea.

Bisogna, tuttavia, sottolineare come le nostre ricerche a Cuma degli ultimi due anni abbiano portato importanti novità in termini di lettura dell'urbanistica del quartiere. La prima è venuta dai sondaggi condotti nella *plateia* B e nello *stenopos* q, nonché dalla rivisitazione attenta della ceramica portata alla luce nei precedenti saggi: i frammenti ceramici dal primo battuto stradale degli *stenopoi* p e q e della *plateia* B si riferiscono al Medio Protocorinzio (690-650 a.C.), non come avevamo precedentemente indicato alla fine del Tardo Geometrico II (720-690 a.C.). Ciò suggerisce un leggero abbassamento della cronologia dell'impianto urbanistico del quartiere, da assegnare probabilmente alla prima fase del Medio Protocorinzio, all'incirca al 690-670 a.C. Ci troviamo, senz'altro, di fronte a un ulteriore momento di forte strutturazione di Cuma, a cui potrebbe non essere estranea la contemporanea crisi di Pithekoussai: a seguito degli eventi vulcanici che incidono pesantemente sulla vita di quest'ultimo sito, alcuni gruppi potrebbero essersi trasferiti sulla terraferma di fronte a Ischia, per l'appunto a Cuma. Naturalmente, la definizione dell'impianto urbano deve essere stata contestualmente, probabilmente principalmente, il risultato di dinamiche di strutturazione interna all'insediamento. Insomma, l'urbanistica di epoca alto-arcaica di Cuma, è non solo il punto di partenza di una continuità insediamentale del quartiere, ma anche il punto di arrivo di una prima fase dell'insediamento che deve essere stata caratterizzata da un'organizzazione topografica differente.

Una seconda novità urbanistica rilevante viene dal saggio in profondità condotto nello *stenopos* q. Tra il VII e il IV sec. a.C. doveva esistere tra la *plateia* B e la *plateia* A un asse stradale intermedio Nord-Sud, che definiva due isolati stretti e lunghi. Ciò consente di ipotizzare per l'isolato orientale una suddivisione in due serie di quattro lotti, di ca. 105/135 m² ciascuno.⁸ Tale ipotesi è suggerita, contestualmente, dalla planimetria dell'abitazione che occupa l'angolo Nord-orientale dell'isolato: essa è databile al V sec. a.C., ma sembra riprendere parzialmente una tipologia arcaica a *pastàs* o a pseudo-*pastàs* (Giglio 2022, 241-242, fig. 7). In epoca tardo-classica o alto-ellenistica tale asse intermedio Nord-Sud viene cancellato, creando un unico isolato che copre tutta l'estensione dalla *plateia* A alla *plateia* B, per dare spazio ai nuovi ampi modelli abitativi.

Lo stesso saggio sullo *stenopos* q ha rivelato una situazione più complessa e, al momento non del tutto chiara, relativa al muro che delimita a Nord l'asse stradale. Questo muro è costituito in età arcaica e classica da una struttura potente in blocchi, caratterizzata da diversi rifacimenti: per l'età arcaica resta aperta l'ipotesi che tale struttura possa aver svolto una funzione difensiva o parzialmente difensiva, come muro di terrazzamento, costituendo un circuito interno più arretrato, rispetto a quello delle mura settentrionali. Il prosieguo delle ricerche potrà offrire informazioni più puntuali, attraverso un auspicabile ampliamento della porzione messa in luce di questa struttura.

Per quanto concerne invece la fase romana, lo scavo del 2024 e del 2025 si è concentrato su una bottega ubicata nell'isolato più settentrionale del quartiere, affacciata sulla *plateia* B. Ne sono state portate alla luce diverse fasi. La più antica, databile tra il periodo tardo-repubblicano e primo-imperiale, si riferisce ad un'officina metallurgica, in cui viene lavorato il ferro: sul piano di calpestio e sui livelli di frequentazione si conservavano in *situ* fondi di forgia, scorie e scarti di lavorazione in abbondanza; inoltre, in posizione centrale era presente una struttura quadrangolare realizzata con grossi blocchi rozzamente sbazzati e cava al centro: si trattava verosimilmente del sostegno del piano dell'incudine. Tra il I e il II sec. d.C. la stessa

⁸ D'Acunto in st. b: ricostruzione grafica di C. Improta.

bottega viene trasformata, realizzandovi sul lato settentrionale grandi vasche in cocciopesto, concepite secondo un sistema di pendenze verso la strada: in questa fase l'identificazione dell'attività produttiva resta incerta. Sul piano topografico più generale, la presenza di questa bottega, insieme ad un'altra posta immediatamente a Sud (scavata nelle campagne degli anni precedenti), documenta una concentrazione di attività produttive in questo isolato posto ai margini della città: tale concentrazione ne suggerisce una vocazione almeno parziale di carattere produttivo, tra il periodo tardo-repubblicano e quello imperiale.

La capanna pre-ellenica: dallo scavo stratigrafico al restauro dei materiali (2022-2025) (F. Nitti)

Tra il 2022 e il 2024, una parte delle ricerche si è concentrata all'interno del peristilio della grande *domus* che in epoca tardo-repubblicana (I sec. a.C.) occupa il settore meridionale dell'isolato posto a Nord delle Terme del Foro. In particolare, lo scavo in profondità condotto in quest'area ha consentito di portare alla luce, al di sotto delle stratigrafie di epoca romana e greca, una capanna di epoca pre-ellenica (D'Acunto *et al.* 2021, 342-347; D'Acunto *et al.* 2023, 8-10).

Sebbene tale struttura non sia stata indagata nella sua interezza a causa dei limiti imposti dai soprastanti ambienti di epoca romana, è stato possibile ricostruire una struttura a pianta ovale o absidata di circa 8×5 m., orientata in senso Nord-Sud. La capanna, realizzata con materiali deperibili, prevedeva un sistema di pali lignei posti lungo il perimetro, riconoscibili attraverso le relative buche di palo, e alzati in materiale vegetale rivestito da argilla cruda (*pisé*). Il piano di vita interno risultava leggermente ribassato rispetto all'esterno ed era articolato in diverse aree funzionali, che documentano lo svolgimento di attività di carattere domestico, con particolare riferimento allo stoccaggio, alla preparazione e al consumo degli alimenti.

Lo scavo di questa capanna, eseguito nel corso delle diverse campagne attraverso un progressivo ampliamento dell'area di indagine, ha in particolare rivelato una eccezionale concentrazione di reperti ceramici in frammenti, in parte collassati su sé stessi *in situ*, in parte dispersi sul piano interno, i quali risultavano parzialmente ricoperti da un sottile strato argilloso accumulatosi progressivamente dopo l'abbandono della struttura (US 28100).

In particolare, nella parte meridionale della capanna, caratterizzata da un andamento absidato, è stato possibile riconoscere un'area destinata allo stoccaggio e alla cottura dei cibi, come evidenziato dal rinvenimento di una vera e propria batteria di olle e fornelli a clessidra, nonché frammenti pertinenti a un forno mobile di forma circolare. Al fine di riuscire a ricostruire i diversi elementi ceramici e di comprenderne la loro disposizione all'interno della capanna, lo scavo di quest'area è stato eseguito seguendo una griglia che tenesse conto della concentrazione dei diversi esemplari, che risultavano schiacciati gli uni sugli altri (Fig. 3). Nella parte settentrionale sono stati invece rinvenuti numerosi frammenti pertinenti a un grande *pithos*, associati a pochi frammenti riferibili a olle e a forme per il consumo di cibi e bevande.



Fig. 3 - Ortomosaico dell'interno della capanna pre-ellenica (elaborazione F. Nitti)

Tale peculiare stato di rinvenimento dei reperti è da ascrivere alla distruzione improvvisa e violenta della struttura, causata verosimilmente da un incendio. Lungo tutto il perimetro si riconoscevano, infatti, ampie tracce di bruciato associate a resti di elementi lignei carbonizzati e frammenti di argilla concotta dall'azione del fuoco.

La rimozione dello strato superficiale depositatosi all'interno della struttura ha consentito di mettere in luce alcuni apprestamenti che contribuiscono a chiarire ulteriormente la distribuzione spaziale della capanna. In prossimità della parte absidata meridionale era situata una struttura da fuoco ricavata mediante un taglio profondo nel piano di calpestio (US 28106), costituita da una camera di combustione di forma circolare e da un breve canale funzionale all'immissione del combustibile. Verso Nord-Est era invece presente un grande focolare circolare, caratterizzato da un deposito di carbone e argilla concotta, cui si associavano diversi reperti ceramici pertinenti a esemplari deputati alla cottura e al consumo del cibo e del vino. Tra questi, si evidenzia in particolare il rinvenimento di alcune coppe greche di produzione euboica, tra cui uno skyphos a chevrons e uno skyphos a semicerchi penduli. Proprio quest'ultimo esemplare offre una puntuale datazione del contesto, collocabile entro e non oltre il secondo quarto dell'VIII sec. a.C. Oltre a fornire un prezioso dato in termini cronologici, il rinvenimento di questa tipologia di coppe costituisce una importante attestazione dei contatti tra la comunità indigena di Cuma e gli Euboici, particolarmente attivi lungo le coste tirreniche nella cosiddetta fase "precoloniale".

I materiali dalla capanna pre-ellenica: le strutture di combustione e i vasi per la cottura e lo stoccaggio dei cibi

(C. Improta)

Nel corso delle campagne di scavo condotte tra il 2022 e il 2024, nei saggi in profondità nel peristilio della domus meridionale di epoca tardo-repubblicana (I sec. a. C.) sono stati rinvenuti numerosi frammenti pertinenti a diverse strutture di combustione e forme ceramiche per la preparazione, la cottura e lo stoccaggio dei cibi riferibili alla capanna pre-ellenica.

Considerate la natura di formazione del contesto e le caratteristiche deposizionali dei reperti, grazie allo scavo effettuato per quadranti, nonostante il significativo grado di frammentarietà dei singoli esemplari, a partire dall' a.a. 2022/2023 hanno avuto inizio delle intense attività di restauro, nella forma di un laboratorio didattico rivolto agli studenti dei corsi di laurea triennale e magistrale in Archeologia dell'Università di Napoli L'Orientale. Tali attività, ancora in corso, dirette dal restauratore P. Musella, con la collaborazione del restauratore C. Nastri, sotto la supervisione di M. D'Acunto, C. Merluzzo, F. Nitti e F. Barone e di chi scrive, hanno determinato la ricostruzione quasi integrale di diversi manufatti.

Alla categoria delle strutture di combustione sono ascrivibili almeno cinque fornelli e un forno a camere sovrapposte, rinvenuti in corrispondenza del settore meridionale dell'area indagata (fornelli: Fig. 3, quad. I.1-3, II.1-3; forno: Fig. 3, quad. II.2-II.3, III.2). I fornelli, utilizzati come sostegno per i vasi per la cottura degli alimenti (olle), sono riferibili al tipo "a clessidra". Sono, infatti, costituiti da una camera inferiore dove era collocato e bruciato il combustibile (camera di combustione), con pianta a ferro di cavallo con un'apertura frontale (sportello) utilizzata per l'inserimento del combustibile, e una camera superiore (camera di cottura/sponda), di forma circolare con pareti ad andamento tronco-conico o tronco-ovoide, dove veniva collocata l'olla. Quest'ultima era appoggiata con il fondo su un diaframma a bracci, forato al centro in due casi, che divideva trasversalmente la camera di cottura/sponda dalla camera di combustione: la cottura degli alimenti, dunque, non avveniva per contatto diretto con il fuoco ma grazie al passaggio dei gas caldi dalla camera inferiore a quella superiore, filtrati dal diaframma (Fig. 4, a) (Moffa 2002, tipo 1, 73-75, fig. 53; Pacciarelli 2016, 179 fig. 6.). I fornelli della capanna pre-ellenica di Cuma sono

caratterizzati, inoltre, dalla presenza di decorazioni plastiche in corrispondenza degli angoli dello sportello della camera di cottura e di cordoni digitati in corrispondenza del punto di raccordo tra le due camere e immediatamente al di sotto del margine della camera di cottura/sponda. I forni a camere sovrapposte sono, invece, strutture di combustione di maggiori dimensioni all'interno delle quali venivano direttamente posti gli alimenti da cuocere. L'esemplare cumano è costituito da un piano forato a pianta circolare con spalletta verisimilmente verticale e da una copertura campaniforme con "alette" di sostegno in corrispondenza del margine inferiore e apertura quadrangolare nella parte superiore, da interpretare come presa d'aria e/o apertura funzionale al sollevamento della copertura stessa o anche all'immissione degli alimenti da cuocere (Fig. 4, *b*).⁹ Il piano forato era posto molto probabilmente all'interno della fossa di forma circolare individuata in prossimità della parte absidata meridionale della capanna e aveva, dunque, la funzione di diaframma rispetto alla fossa stessa che era utilizzata come camera di combustione. Questo tipo di strutture di combustione era destinato molto probabilmente a trattamenti degli alimenti a bassa temperatura, come essiccare frutta e legumi e/o tostare i cereali (Moffa 2002, 80).

In associazione alle strutture di combustione sono state individuate almeno sette olle cordonate (fig. 1, quad. I.1-3, II.1-2, III.1), due delle quali quasi interamente ricostruite. Le olle, prevalentemente di forma tronco-ovoide, sono caratterizzate dalla presenza di un cordone plastico digitato immediatamente al di sotto dell'orlo e da quattro prese a lingua speculari (Fig. 4, *c*). È interessante notare come i due esemplari quasi interamente ricostruiti siano pressappoco identici in termini dimensionali: entrambi hanno infatti diametro all'orlo pari a 26 cm e diametro del fondo in un caso pari a 12 cm, nell'altro pari a 10 cm. Tale dato potrebbe



Fig. 4 - Le strutture di combustione e le forme per la cottura dei cibi dalla capanna pre-ellenica. *a*. Fornello a clessidra. *b*. Forno a piani sovrapponibili. *c*. Olla (foto C. Improta)

⁹ Forni mobili a due o più piani sovrapponibili, riferibili a diverse fasi cronologiche, sono piuttosto diffusi in diversi contesti in Italia, in ambito mediterraneo e in Europa occidentale e centrale (per l'Italia si vedano Moffa 2002, 79, nota 187; Ruffa 2019; per l'ambito mediterraneo e per l'Europa occidentale e centrale si vedano Coulon 2021; Coulon, Fontaine, Proust 2019).

indiziare l'esistenza di una tradizione produttiva delle forme ceramiche specializzate per la cottura degli alimenti, finalizzata alla realizzazione di manufatti di capacità specifiche e costanti, da associare a determinate strutture di combustione, in relazione alle esigenze alimentari della comunità. Le olle potevano essere dotate anche di coperchio, come testimoniato da un esemplare rinvenuto in corrispondenza del piano di calpestio della capanna (US 28106).

In corrispondenza dell'angolo sud-orientale dell'area indagata, sono stati individuati diversi frammenti di pareti e due frammenti contigui di fondo riferibili ad un *pithos* di grandi dimensioni (fig. 1, quad. I.1-2). Recipienti di questo tipo erano impiegati verosimilmente per lo stoccaggio dei cibi solidi ma non è da escludere un loro utilizzo anche come contenitori per bevande, in particolare, vino (Pacciarelli 2011, 53). Nel settore settentrionale dell'area indagata, e in particolare lungo il limite orientale, è stato, inoltre, individuato un altro *pithos*, piuttosto singolare in termini morfologici e decorativi. È, infatti, caratterizzato da un'imboccatura piuttosto ampia (56 cm) con labbro a colletto e da un corpo espanso decorato da cordoni plastici digitati che formano una serie di pannelli rettangolari in corrispondenza della spalla. Lo studio complessivo di tutti i materiali, tuttora in corso, permetterà di determinare, laddove possibile, con maggior precisione eventuali ulteriori ripartizioni funzionali degli spazi interni ed esterni della capanna pre-ellenica.

Ampliamento stenopos q - Settore 44

(M. Capurro)

La campagna archeologica dell'Università di Napoli L'Orientale nel 2025 ha interessato la conclusione di un saggio di scavo, denominato "Settore 44", aperto per la prima volta nel 2023.¹⁰ Esso si pone lungo un tratto che non era stato ancora indagato dell'asse viario settentrionale, il cd. *stenopos q*, che, con andamento Est-Ovest, definisce il limite a Nord dell'isolato dell'abitato greco-romano del sito di Cuma.

L'apertura di un saggio in questo punto della città antica, in un primo momento, era dettata dall'obiettivo di riuscire a definire il limite occidentale del cd. *stenopos q*, ad oggi ancora sconosciuto, e quindi dell'intero isolato abitativo su questo versante. Il rinvenimento sicuro di tale limite, che ancora costituisce un importante limite nella ricostruzione topografica di Cuma, comporterà un significativo salto di qualità nella nostra conoscenza circa l'urbanistica dell'antica *polis* euboica.¹¹

Un secondo fine che stava dietro all'apertura di questo saggio era, contemporaneamente, quello di provare a rintracciare la stessa stratigrafia messa in luce nei precedenti sondaggi realizzati nell'area, posizionati lungo il versante orientale della medesima strada, in prossimità della *plateia B*, durante le campagne archeologiche condotte tra il 2012 e il 2015.¹²

L'area del "Settore 44" risulta essere limitata lungo i lati Nord e Sud da strutture murarie: a meridione è presente un muro in ortostati di grandi dimensioni ben conservato che presenta tracce di rimaneggiamenti e diverse fasi costruttive; a settentrione è visibile un muro in blocchetti di tufo sbozzati ed ammassati, in

¹⁰ Le attività di scavo e le operazioni di documentazione sono state svolte da studenti di triennale e magistrale di università italiane e straniere, sotto la responsabilità di M. Capurro, con la direzione scientifica di M. D'Acunto. Per i risultati preliminari della prima campagna di scavo in questo nuovo settore (settembre 2023), coordinata da Mara Soldatini e che si desidera ringraziare in questa sede per la preziosa collaborazione, si veda D'Acunto *et al.* 2023, 4-5.

¹¹ Per una riflessione in merito, scaturita dalle stratigrafie murarie scavate in particolar modo nella sezione meridionale del "Settore 44", cfr. *infra*.

¹² Si tratta dei saggi che hanno interessato il Sett.30 C, le cui indagini nel 2012 sono state coordinate da Stefano Iavarone, coadiuvato da Giulia Forgione, mentre dal 2013 al 2015 le operazioni sono state coordinate da Sara Napolitano, coadiuvata da G. Forgione e da Marco Tartari. Si vedano in merito D'Acunto *et al.* 2014, D'Acunto *et al.* 2015, 183 e D'Acunto *et al.* 2016, 142.

opera incerta, di cui si conserva intatta solo la porzione lungo l'angolo Nord-orientale del saggio, e che ha sfruttato strutture precedenti.¹³

A partire dalla campagna archeologica del 2023 (D'Acunto *et al.* 2023, 4-5), e continuando nello scavo dell'anno scorso e di quest'anno, è stato possibile rinvenire nell'area del "Settore 44" – correlando le stratigrafie alle strutture murarie che a Nord e a Sud delimitano l'area – una serie di piani, battuti stradali e livelli di frequentazione antropica in fitta e serrata successione, quasi sempre ricchi di materiali ceramici, che ci hanno consentito di ottenere una completa sequenza cronologica delle fasi d'uso dello *stenopòs q* e delle fasi precedenti alla sua impostazione.¹⁴

Se lo scavo del 2023 aveva consentito il rinvenimento di battuti stradali ascrivibili ai più recenti orizzonti cronologici pertinenti alla fase di obliterazione della strada, inquadrabili tra il II e il III sec. d.C. (D'Acunto *et al.* 2023, 4-5), nel corso della campagna del maggio-giugno 2024, sono stati indagati una decina di piani stradali e di livelli di frequentazione antropica, databili, dai più recenti ai più antichi, tra il I sec. d.C. e l'età augustea all'età tardo-arcaica piena, attorno alla metà del VI sec. a.C. Nella campagna di scavo del 2025, invece, si è proseguito con lo scavo nell'area centrale del "Settore 44", mettendo in luce una sequenza stratigrafica complessa. Al di sotto di due battuti stradali (UUSS 44141 e 44142) riferibili – sulla base delle datazioni dei reperti ceramici in essi rinvenuti – al pieno VI sec. a.C.,¹⁵ dalla consistenza assai compatta, è stato possibile rinvenire quello che, con ogni probabilità, costituisce il primo battuto stradale dell'asse viario settentrionale dell'isolato di Cuma, ovvero sia l'US 44151. Quest'ultima unità stratigrafica si presentava assai compatta, di colore grigio chiaro ed era ubicata nella porzione centro-orientale del saggio; oltre a restituire frammenti ceramici, bronzo e resti osteologici, erano presenti sulla sua interfaccia superiore resti di carbone e tracce di ossidazione ferrosa. Si tratta dell'ultimo battuto stradale scavato nell'area del "Settore 44", databile nel PCM (690-650 a.C.).¹⁶

Al di sotto di questa situazione, è stato possibile indagare – negli ultimi livelli stratigrafici in cui era possibile effettuare lo scavo prima di giungere alla falda acquifera alla quota finale di circa 2,60 m dal piano di campagna attuale – un livello alluvionale di consistenza sabbiosa, di colore marrone scuro (US 44152), sempre databile all'orizzonte del PCM sulla base dei materiali ceramici, il quale copriva a sua volta un livello di frequentazione antropica, a matrice sabbiosa, di colore grigio chiaro sul cui piano giacevano evidenti tracce di lavorazione metallurgica (UUSS 44155 e 44157), ancorabile alla stessa cronologia. Infine, come ultima unità stratigrafica individuata, ma non scavata completamente, è stata rinvenuta l'US 44160, ossia un livello terroso di colore grigio con lenti scure di colore più scuro, forse sempre correlato ad esiti della lavorazione dei metalli.

Queste ultime fasi descritte, evidentemente, appartengono ad un momento subito precedente all'imposizione dello *stenopòs q*, in un'area della città bassa di Cuma che, prima di conoscere la definizione urbana, era anche utilizzata a fini lavorativo-produttivi, in prossimità delle mura settentrionali della *polis* e non distante dalla bottega metallurgica poco più a Nord-Est nell'isolato abitativo, che è stata indagata a più riprese dalla nostra Missione (D'Acunto, D'Onofrio, Nitti 2021).

¹³ Al di sotto del quale è stato possibile scavare una intricata sequenza stratigrafica muraria, per cui si veda *infra*.

¹⁴ Considerando la sequenza a partire dai livelli stratigrafici superiori, asportati già in occasione della campagna del 2023, e fino alle ultime stratigrafie indagate quest'anno, le fasi d'uso dello *stenopòs q*, su base ceramica, abbracciano un orizzonte cronologico che parte agli inizi del III sec. d.C. e si arresta – con una netta cesura di età ellenistica – nella prima metà del VII sec. a.C.

¹⁵ Lo studio dei materiali e, in particolar modo, dei reperti ceramici provenienti dal "Settore 44" sono in corso di studio da parte di Cristiana Merluzzo, che ringrazio molto per avermi fornito le indicazioni che riporto nel testo circa la datazione degli strati; ma, in merito, v. anche *infra*.

¹⁶ Come noto da tempo, l'impianto urbano di Cuma, rintracciato nell'isolato abitativo indagato da L'Orientale di Napoli a partire dal 2007, venne impiantato agli inizi del VII sec. a.C. Si vedano D'Acunto, D'Onofrio, Nitti 2021, 228-229, con bibliografia.

Per quanto attiene, invece, alle strutture murarie rinvenute nell'area del "Settore 44", a Nord (Fig. 5), nei pressi del limite del saggio, è stato possibile scavare una sequenza stratigrafica abbastanza intricata.

L'elemento strutturale più antico, rinvenuto nella porzione inferiore della sezione Nord, è costituito dalla parte sommitale – conservata per una lunghezza massima di circa 1,80 m – di una imponente struttura muraria con andamento Est-Ovest (USM 44150). La struttura, nel tratto conservato all'interno del saggio, è costituita da tre blocchi tufacei di forma parallelepipedica: il primo misura 41×9 cm; il secondo – l'unico ad essere interamente conservato in



Fig. 5 - Cuma, isolato abitativo: "Settore 44", veduta da Sud della sezione settentrionale dello scavo (foto M. Capurro)

lunghezza – misura 91×22 cm; infine, il terzo misura 30×7 cm. La struttura è stata scavata per circa 10 cm di altezza: non è stato possibile procedere con la sua totale messa in luce poiché si è raggiunta la falda acquifera sul fondo del saggio che, per motivi di sicurezza, ha causato la sospensione dello scavo. La porzione dell'USM 44150 rinvenuta all'interno dello "Settore 44" costituisce senz'altro una ristretta parte dell'antica struttura, dal momento che è stato possibile notare che i blocchi tufacei di cui è costituita si estendono sia in direzione orientale che in direzione occidentale ben al di fuori dei limiti del saggio. Questa struttura, databile in epoca alto-arcaica, per la sua imponentza, può far pensare ad un qualche apprestamento difensivo, considerata anche la vicinanza con le mura settentrionali dell'abitato poco più a Nord rispetto al "Settore 44".¹⁷

Al di sopra di questa struttura muraria, nell'angolo Nord-occidentale del saggio, si imposta un ragguardevole blocco tufaceo in termini dimensioni (USM 44136), purtroppo dal cattivo stato di conservazione,¹⁸ probabilmente parte dell'elevato di una seconda struttura muraria che sfruttava l'USM 44150 come fondazione. Il blocco nella sua interezza presenta le seguenti misure: 80×35 cm; si segnala, inoltre, che l'USM 44136 continua al di fuori dei limiti del saggio, proseguendo in direzione occidentale. La lavorazione della facciata di questo blocco, così come della struttura muraria sottostante che sfrutta come fondazione, è ben liscia, meno che per la porzione superiore della struttura, la quale risulta maggiormente compromessa. Per motivi che non è al momento possibile stabilire, questa struttura non proseguiva, dunque, in direzione orientale.

Nella parte orientale della sezione Nord del "Settore 44", collocata in una fase evidentemente successiva, è stato possibile scavare una struttura muraria di fondazione costituita da due blocchi tufacei di forma parallelepipedica, dall'andamento Est-Ovest (USM 44145). Della presente struttura stratigrafica muraria è possibile vedere nella sua interezza soltanto il blocco occidentale, che presenta le seguenti dimensioni: 40×38 cm; il blocco orientale (compromesso in termini di conservazione nella sua porzione

¹⁷ Si veda *supra*.

¹⁸ Il blocco, infatti, presenta nell'angolo Sud-orientale un ingente frattura di forma semicircolare.

inferiore), invece, conservato per 30×34 cm, prosegue al di fuori dei limiti del saggio verso Est. Tra i due blocchi, sulla cresta, si registra la presenza di una frattura di forma approssimativamente triangolare. Sia la cresta della struttura che la sua faccia a vista risultano essere regolari e ben lavorate.

L'USM 44145 serviva da fondazione per la più imponente delle strutture murarie che sono state scavate nella porzione settentrionale del "Settore 44". Si tratta dell'USM 44106, emersa già nel corso della campagna del 2024. La struttura muraria è costituita da due blocchi tufacei, ben lavorati e squadri, di forma parallelepipedica, con andamento Est-Ovest. La tecnica edilizia è quella ben nota dell'opera quadrata in assise piana e l'USM presenta un buono stato di conservazione. Il primo ortostato, a Ovest, è osservabile nella sua interezza, meno che per una frattura nell'angolo superiore Nord-occidentale, e misura 85×95 cm; il secondo ortostato, che prosegue oltre i limiti del saggio verso Est, è conservato in altezza per 85 cm e in lunghezza per circa 32 cm. L'USM 44106 si può datare, oltre che per tecnica edilizia, sebbene non sia un metodo di totale affidamento, anche su base stratigrafica. Infatti, come osservato sin dalla campagna del 2024, l'ultimo battuto che copriva la struttura muraria era l'US 44117, datata su base ceramica, tra la fine del VI sec. a.C. e gli inizi del V sec. a.C.: dunque, la struttura muraria si data necessariamente ad una fase subito precedente rispetto a quest'intervallo cronologico, riflettendo comunque un orizzonte ancora pienamente tardo-arcaico.

In una fase ancora successiva, ad Ovest di USM 44106, creando un leggero scasso di forma semicircolare nella porzione occidentale del primo ortostato della struttura muraria citata, viene realizzata un'altra struttura muraria composta da tre blocchi tufacei quadrangolari di più piccole dimensioni, avente sempre andamento Est-Ovest (USM 44135), dalla misura totale di 92×32×22 cm.¹⁹

La cesura definitiva di questa precedente situazione strutturale nella porzione settentrionale del "Settore 44", che aveva conosciuto più e diverse fasi leggibili su base stratigrafica muraria, è per noi costituita dalla struttura muraria con andamento Est-Ovest realizzata in blocchetti di tufo sbozzati ed ammalati con malta biancastra, in opera incerta, di cui si conserva intatta solo la porzione lungo l'angolo Nord-orientale del saggio (USM 44154). Tale struttura, come detto in precedenza, costituisce il limite dello *stenopòs q* a settentrione attualmente visibile nell'abitato di Cuma, e sfrutta parte delle strutture precedenti come fondazione.²⁰

Per quel che concerne la sezione Sud del "Settore 44" (Fig. 6), infine, anche qui è emersa una complessa sequenza stratigrafica di fasi relativa alle strutture murarie scavate.

Su questo versante la struttura muraria più antica che è stata possibile rinvenire è costituita dall'USM 44005, ovvero un ortostato tufaceo di forma parallelepipedica con andamento Est-Ovest, dal non ottimale stato di conservazione. L'USM 44005 continua oltre i limiti del saggio al di sotto della sponda orientale e presenta le seguenti dimensioni, nel tratto conservato: 104×65 cm. Questa struttura probabilmente costituiva il limite dello *stenopòs q* sul versante occidentale, in epoca arcaico-classica, forse nel punto in cui esso era incrociato da un precedente asse viario con andamento Nord-Sud, oggi non più visibile. Questa situazione, in ogni caso, conobbe una significativa cesura, probabilmente in età ellenistica, nel momento in cui l'asse viario fu obliterato e, dunque, fu alterata la fisionomia di questo possibile incrocio. Lo testimoniano le altre due strutture murarie che sono venute alla luce sul versante occidentale della porzione meridionale del "Settore 44", l'USM 44146 e l'USM 44140.

¹⁹ Segnaliamo anche che sulla cresta di questa USM sono ancora visibili tracce di lavorazione di cava (tagli di accetta?), con andamento Nord-Sud.

²⁰ In particolare, nell'angolo Nord-orientale del saggio è ben visibile questo fenomeno, dato che la ristretta porzione della struttura in cementizio nella parte inferiore riutilizza una parte di un ortostato più antico tagliato in maniera netta in basso, mentre a Ovest è tagliato in maniera curvilinea.

L'USM 44146 è costituita da due blocchi tufacei irregolari, di forma approssimativamente quadrangolare, che sono ubicati subito a Ovest di USM 44005 e che si appoggiano a questa struttura muraria, dunque da datarsi necessariamente a una fase successiva rispetto alla prima struttura muraria menzionata. Il primo blocco, quello superiore, misura 40×43×59 cm; il secondo, inferiore, misura 54×40×34 cm. La struttura è interpretabile come un rimaneggiamento precedente – o contestuale, è difficile dirlo su base stratigrafica – dell'estremità occidentale di USM 44005 funzionale alla messa in opera della struttura muraria in ortostati con andamento Est-Ovest ubicata nell'angolo Sud-occidentale del saggio (USM 44140).



Fig. 6 - Cuma, isolato abitativo: “Settore 44”, veduta da Nord della sezione meridionale dello scavo (foto M. Capurro)

Quest'ultima unità stratigrafica è lunga 1,90 m, larga 33 cm e alta 70 cm, ed è composta da due ortostati visibili di cui solo il più orientale è perfettamente conservato. Infatti, il secondo ad Ovest risulta completamente tagliato da un taglio con andamento trasversale. La lavorazione della cresta della struttura muraria è abbastanza regolare mentre la faccia a vista risulta essere appena sbazzata e presenta numerosi fori circolari di piccole dimensioni (2-3 cm), forse dovuti alla presenza di radici.

L'USM in questione costituisce la chiusura dello *stenopòs q* a Sud, probabilmente in età ellenistica, segnando una significativa discontinuità d'uso in questa porzione della maglia urbana cumana.²¹

Materiali ceramici provenienti dal Sett. 44

(C. Merluzzo)

Nell'ambito delle attività di classificazione svolte durante la campagna di scavo del 2025, ci si è concentrati in particolare sui battuti stradali e sui livelli di frequentazione antropica del saggio in profondità nello *stenopòs q* (settore 44).²²

I risultati emersi si dimostrano essenziali in quanto permettono di comprendere il rapporto delle stratigrafie rinvenute con le strutture murarie messe in luce nelle campagne degli anni 2023-2025 e in particolare, anche in questo settore, risultano un elemento chiave per la comprensione dell'utilizzo dell'area come asse stradale, con l'impostazione dello *stenopòs q*, e dei precedenti livelli antropici rinvenuti. Inoltre, l'analisi permetterà in futuro di confrontare il dato non solo con i risultati dei saggi di approfondimento condotti nello *stenopòs q* durante le scorse campagne di scavo, ma anche di gettar luce sull'urbanistica

²¹ Soltanto nel corso del I sec. d.C. venne realizzato il marciapiede (USM 44079) che si addossa alla situazione muraria visibile sul lato Sud del “Settore 44”.

²² Le attività di classificazione dei reperti ceramici sono state svolte da Cristiana Merluzzo assieme agli studenti dei corsi di laurea triennale e magistrale dell'Università di Napoli L'Orientale durante la campagna di scavo di maggio-giugno 2025. Si ringrazia M. Capurro per aver fornito specifiche puntuali per le stratigrafie rinvenute e per il costante confronto durante lo studio dei reperti.

dell'isolato in epoca alto-arcaica e arcaica, analizzando le stratigrafie rinvenute nel corso dei saggi di approfondimento condotti lungo gli altri assi stradali (*stenopòs p* e *plateia B*).²³

Durante la campagna del 2024 sono emersi una serie di battuti di epoca romana, in particolare riconducibili ad un arco cronologico che va dall'età flavia alla prima età imperiale, cui immediatamente seguono battuti di epoca tardo-arcaica/classica. Tali battuti hanno restituito frammenti ceramici di piccole dimensioni, di cui è stato possibile riconoscere in particolare esemplari di ceramica a vernice nera attica, coppe ioniche del tipo B2 e bucchero.²⁴ Entrando nel merito delle attività condotte durante la campagna del 2025, i battuti stradali rinvenuti (UUSS 44141 e 44142) hanno restituito pochi frammenti diagnostici, riconducibili per lo più a coppe ioniche, che hanno permesso di datare gli strati nel pieno VI sec. a.C. A seguire, sono stati individuati due sottili strati a matrice sabbiosa riconosciuti come livelli di accrescimento (UUSS 44148 – 44149), che hanno restituito materiali ancora riferibili ad un orizzonte di VI sec. a.C., come nel caso di US 44148, dove è stato rinvenuto un frammento di aryballos sferico, e da US 44149, dove sono stati rinvenuti soprattutto frammenti di bucchero pesante riferibili a forme aperte (calici e kantharoi) e frammenti residuali, in particolare un fondo di kotyle con raggi, una spalla di aryballos con cani correnti e frammenti di skyphoi a fascia risparmiata e a sigma, riconducibili ad un orizzonte più antico. Il primo battuto riconosciuto, US 44151, ha restituito invece pochi frammenti diagnostici, in particolare esemplari di ceramica italogeometrica e protocorinzia di importazione e imitazione locale, riferibili con molta probabilità al Protocorinzio Medio (690-650 a.C.). Allo stesso orizzonte cronologico appartiene anche US 44152, interpretato come livello alluvionale, nel quale sono stati rinvenuti un frammento di labbro di skyphos a sigma, il fondo di una pisside protocorinzia, frammenti di anfore di importazione. Precedenti all'impostazione dello *stenopòs q* sono i livelli di frequentazione antropica con tracce di lavorazione metallurgica (UUSS 44155 e 44157): anche in questo caso la datazione conferma la cronologia al Protocorinzio Medio (690-650 a.C.) sulla base del rinvenimento di frammenti di skyphoi a sigma e di un fondo di oinochoe con raggiera; inoltre non mancano frammenti residuali, come nel caso di un labbro di skyphos di tipo Thapsos di importazione. Per quanto concerne l'ultimo livello indagato, US 44160, i materiali ceramici rinvenuti sono attualmente in corso di studi.

La bottega metallurgica - Settore 41

(M. Soldatini)

Le indagini della nostra missione archeologica stanno svelando il ricco panorama urbano e produttivo dell'antica città di Cuma. In particolare, l'area Nord del Quartiere Settentrionale, a ridosso delle mura, si sta rivelando un fulcro vitale per l'artigianato greco-romano, con una forte vocazione alla lavorazione dei metalli.

L'attenzione si è focalizzata sul Settore 41, un'area compresa tra lo *stenopòs q*, limite settentrionale dell'isolato a Nord delle Terme del Foro, e le mura urbane. Le strutture indagate, pur rientrando in una probabile domus romana, presentano murature in ortostati (grandi blocchi di pietra) di notevoli dimensioni,

²³ Oltre i saggi di approfondimento nello *stenopòs q*, nel corso delle campagne di scavo a Cuma sono stati condotti saggi di scavo nello *stenopòs p* (negli anni 2012-2013 le operazioni di scavo sono state a cura di M. Giglio, negli anni 2014-2015 a cura di M. Barbato) e nella *plateia B* (saggi stratigrafici sono stati diretti da D. Volpicella, da M. Giglio e da M. Gelone; un saggio di scavo è stato condotto da M. Giglio e successivamente ripreso nel 2021 da B. Musella e negli anni 2022-2023 da C. Improta). I materiali ceramici provenienti dai saggi di approfondimento condotti lungo gli assi stradali sono in corso di studio da parte di C. Merluzzo

²⁴ Si segnala in particolare il rinvenimento di un calice quasi integro in bucchero pesante. I materiali ceramici in bucchero provenienti dall'abitato di Cuma sono in corso di studio da parte di F. Nitti.

compatibili con tecniche edilizie risalenti al V secolo a.C. Ciò suggerisce che l'edificio abbia radici nell'età classica greca e sia stato poi riutilizzato e modificato in epoca romana.

Le campagne di scavo, svoltesi a partire dal 2023 sotto la supervisione di M. D'Onofrio, M. Capurro e chi scrive con il supporto di Francesco Nitti, si sono concentrate in profondità su un vano a nord delle *fauces* (l'ingresso). Grazie alla collaborazione degli studenti di triennale e magistrale, la ricerca ha progressivamente rivelato la destinazione d'uso di questo ambiente: una bottega metallurgica, caratterizzata da una chiara specializzazione spaziale.

Le evidenze più interessanti legate all'attività produttiva includono la scoperta di due vaschette rettangolari in cocciopesto, presumibilmente utilizzate per contenere liquidi o materiali funzionali all'attività artigianale per le fasi più recenti di uso di quest'area. Mentre le più antiche sono legate alla presenza di fondi di forgia (un focolare specializzato per scaldare il metallo) e una vasta dispersione di scorie ferrose (piatte e globulari, residui di fusione e lavorazione) confermano inequivocabilmente la destinazione d'uso dell'area indagata. È ben visibile, infatti, una marcata alterazione cromatica (scura e satinata) della superficie del piano, in particolare lungo il lato orientale (US 41624 e US 41653), a causa della densità di inclusione di scorie ferrose, a dimostrazione dell'intensità del lavoro di questa bottega. In particolare, il rinvenimento di fondi di forgia sia in giacitura primaria e altre in giacitura secondaria, ha permesso di conoscere l'intensità e la continuità d'uso che deve aver avuto tale struttura.

Tale campagna di scavo ha avuto un duplice merito: non solo ha permesso di confermare l'ipotesi di una vocazione artigianale per gli ambienti più settentrionali del quartiere, che in linea con le precedenti indagini attesterebbe tale connotazione fin dalle prime fasi della monumentalizzazione urbana, ma ha anche consentito di definire con precisione l'assetto funzionale interno di questa bottega metallurgica. L'intero lato orientale della struttura era la zona produttiva attiva, identificata come l'area dedicata alla fusione, alla martellazione e alla battitura dei metalli: in particolare procedendo da sud verso nord, sono state messe in luce evidenze di una camera di combustione di un forno (US 41630), un'area ricca di strati di scorie e l'area della forgia (Fig. 7). Al contrario, il settore occidentale ha restituito una notevole mole di tagli, molto profondi, nel piano pavimentale ricchi di scarti misti: non solo residui metallici, ma anche un'alta concentrazione di frammenti ceramici,²⁵ alcuni dei quali ricomponibili integralmente (US 41650). Sebbene manchino le prove dirette di un'attività ceramica in situ (come forni o scarti di lavorazione specifici), la massiccia presenza di questi reperti, concentrati in particolare vicino all'angolo sud-occidentale e a ridosso della canaletta meridionale, suggerisce che l'area fosse utilizzata come deposito o punto di raccolta per gli scarti generati sia dalla bottega che, potenzialmente, da altre attività della domus o del quartiere circostante, lasciando aperto l'interrogativo sulla sua funzione completa.



Fig. 7 - Cuma, bottega metallurgica: "Settore 41". Foto generale da est del settore indagato e delle aree funzionali alle diverse fasi della catena operativa della lavorazione della bottega metallurgica (foto M. Soldatini)

²⁵ Tali materiali sono in corso di studio da parte di V. Linguiti e S. Sorrentino.

Nel corso della sua vita, l'ambiente subì significative trasformazioni. In una fase successiva, databile tra il I e il II secolo d.C., le tracce della bottega vennero obliterate da un nuovo piano pavimentale. In questo periodo, l'ambiente ottenne un accesso monumentale dalla *plateia* B (asse stradale con orientamento N-S che rappresenta il limite orientale dell'isolato indagato), scandito da una soglia in marmo. Successivamente, il vano fu suddiviso da un tramezzo murario, creando due ambienti più piccoli, e l'accesso fu modificato con una soglia più piccola in cocciopesto che ne ridimensionò la monumentalità.

La storia dell'edificio si conclude tra la metà del II e gli inizi del III secolo d.C. con un poderoso strato di distruzione composto da grandi blocchi di tufo e detriti di crollo, che testimonia la fine violenta della struttura. Unicamente il vano meridionale, sebbene in modo limitato, mostra segni di una successiva e parziale risistemazione post-crollo, con lacerti di piani in terra battuta, la cui datazione rimane tuttavia incerta per la scarsità di reperti diagnostici.

In conclusione, l'indagine nel Settore 41 ha portato alla luce una cruciale bottega artigianale di epoca imperiale, ma ha soprattutto documentato la complessa stratificazione e l'evoluzione di un'area urbana che ha attraversato secoli di storia, dalla sua origine greca fino al suo epilogo in piena età romana.

BIBLIOGRAFIA

Botto, M. (2021) Phoenician Trade in the Lower Tyrrhenian Sea between the 9th and 8th Centuries BC: the Case of Cumae", in T.E. Cinquantaquattro, M. D'Acunto, F. Iannone (eds.), *Euvoica II. Pithekoussai and Euboea between East and West*, Vol. 2 (Proceedings of the Conference, Lacco Ameno, Ischia, Naples, 14-17 May 2018), *AION Annali di Archeologia e Storia Antica* n.s. 28, pp. 461-500.

Coulon, J. (2021) *Le four de Sévrier et autres fours et fourneaux d'argile aux âges des métaux en Europe occidentale*. Oxford.

Coulon, J., C. Fontaine, D. Proust (2019) Studio termico di un forno protostorico: tra teoria e pratica, in A. Peinetti, F. Debandi, M. Cattani (a cura di), *Focolari, forni e fornaci tra Neolitico ed età del Ferro. Comprendere le attività domestiche e artigianali attraverso lo studio delle installazioni pirotecniche e dei residui di combustione* (Atti del VI Incontro Annuale di Preistoria e Protostoria, Bologna, 29 marzo 2019), pp. 351-368. Firenze (Istituto Italiano di Preistoria e Protostoria).

Criscuolo, P., M. Pacciarelli (2008) La facies cumana della prima Età del Ferro nell'ambito dei processi di sviluppo medio-tirrenici, in *Cuma* (Atti del XLVIII Convegno di Studi sulla Magna Grecia, Taranto, 27 settembre – 1 ottobre 2008), pp. 323-351. Napoli.

D'Acunto, M. (2017) Cumae in Campania during the Seventh Century BC, in X. Charalambidou, C. Morgan (eds.), *Interpreting the Seventh Century BC: Tradition and Innovation* (Proceedings of the International Conference held at the British School at Athens, 9th-11th December 2011), pp. 293-329. Oxford.

D'Acunto, M. (2020a), Abitare a Cuma: nuovi dati sull'urbanistica e sull'edilizia domestica di età alto-arcaica e arcaica, in F. Pesando, G. Zuchtriegel (a cura di), *Abitare in Magna Grecia: l'età arcaica* (Atti del Convegno, Napoli-Paestum, 15-16 marzo 2018), pp. 37-54. Pisa.

D'Acunto, M. (2020b), The Bay of Naples, in I.S. Lemos, A. Kotsonas (eds.), *A Companion to the Archaeology of Early Greece and the Mediterranean*, Vol. 2, pp. 1287-1310. Hoboken NJ (USA).

D'Acunto, M. (2020c) Cuma: i sistemi di regimentazione delle acque di epoca arcaica, la pianificazione urbana e la tirannide di Aristodemo, in E. Bianchi, M. D'Acunto (a cura di), *Opere di regimentazione delle acque in età arcaica. Roma, Grecia e Magna Grecia, Etruria e mondo italico*, pp. 255-324. Roma.

D'Acunto, M. (2022a) Il popolamento del sito e la città in età greca, campana e romana, in F. Pagano, M. Del Villano (a cura di), *Terra. La scultura di un paesaggio* (Catalogo della Mostra, Pozzuoli – Rione Terra, 14 dicembre 2021 – 31 marzo 2022), pp. 48-65. Roma.

D'Acunto, M. (2022b) Cumae, in *Oxford Classical Dictionary*. (<https://doi.org/10.1093/acrefore/9780199381135.013.1950>).

D'Acunto, M. (2025a) Cuma nel periodo pre-coloniale e coloniale attraverso gli scavi dell'Università di Napoli L'Orientale: frammenti di ceramica, frammenti di contesti, frammenti di storia, in C. De Mizio *et al.* (a cura di), *FraMeS. Frammenti, Memorie, Storie* (Atti del Convegno Internazionale, Pisa, 26-27 ottobre 2023), *Rassegna di Archeologia* 31, pp. 137-149.

D'Acunto, M. (2025b) Cumae and Pithecusae, in P. Cartledge, P. Christesen (eds), *The Oxford History of the Archaic Greek World: Volume III: Cumae to Cyprus*. New York–Oxford. (<https://doi.org/10.1093/oso/9780199383511.001.0001>).

D'Acunto, M. (in st. a), Cumae in Campania: Sailors, Traders, Settlers and Potters, from the Pre-Hellenic Period to the Dawn of the Colonization, in I. Lemos, A. Tsingarida (eds.), *Sailors, Traders, Settlers, and Potters. Interactions and Exchanges in the Ancient Mediterranean* (Proceedings of the Conference, Bruxelles, 18 April 2024).

D'Acunto, M. (in st. b), Cuma: urbanistica (e lottizzazione?) di età arcaica nel quartiere a nord delle Terme del Foro, in E. Botte, L. Cavassa (a cura di), *Studi in onore di Jean-Pierre Brun*.

D'Acunto, M., M. Giglio, S. Iavarone, D. Volpicella *et alii* (2014), Gli scavi dell'Università degli Studi di Napoli "L'Orientale" nell'abitato greco-romano di Cuma (2007-2013), *Newsletter di Archeologia CISA* 5, pp. 21-38.

D'Acunto, M., M. Giglio, S. Iavarone, M. Barbato, G. Borriello, M. Gelone, S. Napolitano (2015) Abitato antico di Cuma (NA), campagna di scavo 2014, *Newsletter di Archeologia CISA* 6, pp. 179-190.

D'Acunto, M., M. Giglio, S. Iavarone, M. Barbato, G. Borriello, L. Carpentiero, M. Gelone, S. Napolitano, S. Carnevale, C. Penzone, M. Tartari (2016) Cuma, il quartiere greco-romano tra le Terme del Foro e le mura settentrionali: campagna di scavo del 2015, *Newsletter di Archeologia CISA* 7, pp. 137-151.

D'Acunto, M., M. D'Onofrio, F. Nitti (2021) Cuma, dall'occupazione pre-ellenica all'abitato greco-romano. Nuovi dati dagli scavi dell'Università degli Studi di Napoli L'Orientale tra le Terme del Foro e le mura settentrionali, in *Puteoli Cumae Misenum, rivista di studi e notiziario del Parco Archeologico dei Campi Flegrei* 1, pp. 225-243.

D'Acunto, M., M. Barbato, M. D'Onofrio, M. Giglio, C. Improta, C. Merluzzo, F. Nitti, F. Somma (2021) Cumae in Campania: The Earliest Phases in the Light of the Recent Archaeological Research of the University of Napoli L'Orientale, in T. Cinquantaquattro, M. D'Acunto, F. Iannone, *Euboica II. Pithekoussai and Euboea between East and West* (Proceedings of the Conference, Lacco Ameno, Ischia, Naples, 14-17 May 2018), *AION Annali di Archeologia e Storia Antica* n.s. 28, pp. 305-448.

D'Acunto, M., E. Auzino, G. Borriello, L. Carpentiero, G. Forlano, M. Giglio, S. Iavarone, C. Improta, C. Merluzzo, F. Nitti, P. Valle (2022) Gli scavi nell'abitato greco-romano e nelle sue fasi precedenti, in F. Pagano, M. Del Villano (a cura di), *Terra. La scultura di un paesaggio* (Catalogo della Mostra, Pozzuoli – Rione Terra, 14 dicembre 2021 – 31 marzo 2022), pp. 76-90. Roma.

D'Acunto, M., M. Capurro, M. D'Onofrio, C. Improta, C. Merluzzo, F. Nitti, M. Soldatini (2023) Cuma, il settore a nord delle Terme del Foro: la campagna di scavo condotta dall'Università di Napoli L'Orientale del 2023, *Archeologie tra Oriente e Occidente* 2, pp. 1-13.

D'Acunto, M., F. Nitti (2023) L'abitato di Cuma tra il periodo alto-arcaico e quello classico: quadro generale e contesti domestici, in F. Pagano, M. Del Villano, F. Merlati (a cura di), *Toccare Terra. Approdi e Conoscenze* (Atti del Convegno, Baia, 14-16 dicembre 2021), pp. 75-88. Sesto Fiorentino (Firenze).

d'Agostino, B., M. D'Acunto (2008) La città e le mura: nuovi dati dall'area Nord della città antica, in *Cuma* (Atti del XLVIII Convegno di Studi sulla Magna Grecia, Taranto, 27 settembre – 1 ottobre 2008), pp. 481-522. Napoli.

Gastaldi, P. (2018) Cuma: prima della polis, *AION Annali di Archeologia e Storia Antica* 25, pp. 161-206.

Giglio, M. (2022) Abitare a Cuma: evidenze delle abitazioni di epoca classica e alto-ellenistica, *AION Annali di Archeologia e Storia Antica* n.s. 29, pp. 235-246.

Iavarone, S. (2016) Tra pubblico e privato: funzione ed evoluzione dei marciapiedi alla luce di un nuovo contesto dall'abitato di Cuma, in G. Camodeca, M. Giglio (a cura di), *Puteoli. Studi di storia ea archeologia dei Campi Flegrei*, pp. 43-66. Napoli.

Iavarone, S. (2023) L'abitato di Cuma: edilizia privata e cultura abitativa in età imperiale, in F. Pagano, M. Del Villano, F. Mermati (a cura di), *Toccare Terra. Approdi e Conoscenze* (Atti del Convegno, Baia, 14-16 dicembre 2021), pp. 89-97. Sesto Fiorentino (Firenze).

Moffa, C. (2022) *L'organizzazione dello spazio sull'acropoli di Broglio di Trebisacce. Dallo studio delle strutture e dei manufatti in impasto di fango all'analisi della distribuzione dei reperti*, in R. Peroni, A. Vanzetti (a cura di), *Prima di Sibari 2* (Grandi contesti e problemi della protostoria italiana 6). Firenze.

Pacciarelli, M. (2011) Giorgio Buchner e l'archeologia preistorica delle isole tirreniche, in C. Gialanella, P.G. Guzzo (a cura di), *Dopo Giorgio Buchner. Studi e ricerche su Pithekoussai*, pp. 43-56. Pozzuoli.

Pacciarelli, M. (2016) Castiglione d'Ischia e i mutamenti del popolamento insulare nel Tirreno meridionale tra il tardo Bronzo e il primo Ferro, in A. Cazzella, A. Guidi, F. Nomi (a cura di), *Ubi minor ... Le isole del Mediterraneo centrale dal Neolitico ai primi contatti coloniali* (*Scienze dell'Antichità* 22), pp. 171-186.

Ruffa, M. (2019) Piani forati portatili da Gropello Cairoli (PV), loc. S. Spirito, in A. Peinetti, F. Debandi, M. Cattani (a cura di), *Focolari, forni e fornaci tra Neolitico ed età del Ferro. Comprendere le attività domestiche e artigianali attraverso lo studio delle installazioni pirotecologiche e dei residui di combustione*, Atti del VI Incontro Annuale di Preistoria e Protostoria (Bologna, 29 marzo 2019), pp. 265-274. Firenze (Istituto Italiano di Preistoria e Protostoria).



Le ricerche presso la villa imperiale del Pausilypon nel 2025

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Abstract

L'Università di Napoli L'Orientale ha in corso dal 2022 campagne di scavo e documentazione presso la villa imperiale del Pausilypon a Napoli; nel 2025 ci si è concentrati nell'area delle terme superiori, già oggetto di scavi negli anni passati, e in un nuovo settore a ridosso di uno dei peristili della villa. In questa zona è stato possibile indagare un imponente salone, già scavato nell'Ottocento, con ampia esedra provvista di basamento per un gruppo statuario.

Keywords: Pausilypon, villa imperiale, terme

Citation: Giglio, M., Le ricerche presso la villa imperiale del Pausilypon nel 2025, *Archeologie tra Oriente e Occidente*, vol. 3-4, pp. 25-29, <https://doi.org/10.6093/archeologie/13091>

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Le attività di ricerca archeologica presso la villa imperiale del Pausilypon hanno avuto inizio nel 2022¹ e sin dal primo momento si sono concentrate nel settore delle cd. "Terme superiori". L'area oggetto della concessione per attività di ricerca è, tuttavia, più ampia e comprende le terme, parte del settore residenziale e aree con apprestamenti idrici.

Negli ultimi anni è stato possibile indagare in estensione il cd. *calidarium*, definendone le fasi edilizie, che vanno dall'età tardo-repubblicana al IV d.C. Nell'area delle terme, inoltre, si sono indagati alcuni spazi connessi con il *praefurnium* del *calidarium*, che presentano una fase edilizia precedente, quando il settore era occupato da un ambiente residenziale con pavimento a mosaico.

Le recenti indagini del 2025² hanno interessato sia l'area delle terme sia un nuovo settore, localizzato nella zona di ampliamento della concessione di ricerca (Fig. 1).

Nell'area delle terme superiori è proseguito lo scavo dell'ambiente posto immediatamente a nord-ovest del *calidarium* e con esso comunicante tramite un'apertura, relativa alla fase di occupazione di epoca più recente. L'area era già stata oggetto di indagini nel 2023 e 2024. Durante le precedenti campagne era stato possibile mettere in luce, al di sotto di depositi di epoca moderna, il limite nord e ovest di un ambiente quadrangolare, delimitato da strutture in blocchi squadrati di tufo, con rivestimento di sottile malta cementizia. L'accesso all'ambiente, definito da lievi paraste, avveniva dal lato del *calidarium* e non era stato del tutto indagato; infine, era stata individuata una sorta di banchina lungo il margine opposto all'ingresso. In assenza di elementi cronologici certi – l'ambiente era obliterato da uno strato di taglime di

¹ Le attività di ricerca sono state condotte in regime di concessione di scavo e sin dal primo momento sono state impostate come scavo scuola, vedendo un'ampia partecipazione di studenti dei corsi di studio triennale e magistrale dell'Ateneo. Per un inquadramento delle campagne di ricerca precedenti si rimanda a Giglio *et al.* 2022 e Mattei 2023. Si ringrazia la SABAP per il comune di Napoli, nella persona del Soprintendente Arch. Rosalia D'Apice e del funzionario responsabile dott. Enrico Angelo Stanco, per il costante dialogo e supporto.

² Le attività di ricerca del 2025 si sono svolte sotto la direzione scientifica del dott. Marco Giglio; la dott.ssa Angela Bosco e Mauro Palumbo si sono occupati della costruzione di una maglia topografica, nonché di rilievi con LiDAR da UAS. I saggi di scavo sono stati seguiti da Aurora Matonti, Rosa Bellante e Alessandra Ascione, mentre la gestione dei reperti è stata curata da Gaia Vitiello con la supervisione di Giovanni Borriello. Le attività di ricerca sono state finanziate dal Dipartimento di Asia, Africa e Mediterraneo (DAAM) e dal centro BIMA, sezione Digital Humanities (DH). Si ringraziano la direttrice del DAAM, prof.ssa Roberta Giunta, e la presidente della sezione DH, prof.ssa Maria De Vivo, per il costante sostegno alle iniziative di ricerca.

tufo quasi privo di materiali – si era proposto un inquadramento in epoca altomedioevale, in considerazione della tecnica edilizia, simile a quanto accertato in altri contesti napoletani.

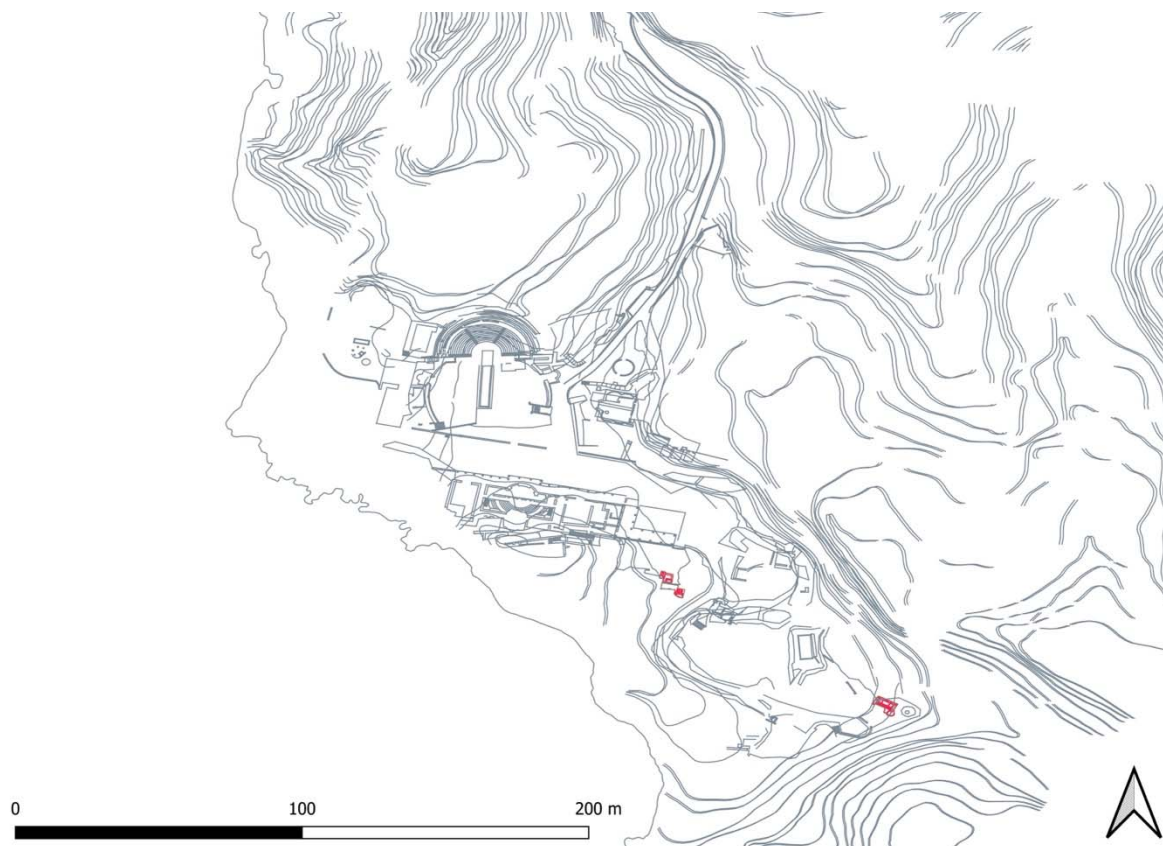


Fig. 1 - Posizionamento delle aree indagate nel corso della campagna del 2025

Lo scavo integrale di una metà dell'ambiente³ (Fig. 2) ha permesso di definire completamente i limiti ovest, nord ed est della struttura più recente, nonché di ripristinare il varco di comunicazione con la zona del *calidarium*. L'edificio, presumibilmente di epoca moderna o contemporanea, si imposta direttamente al di sopra delle strutture più antiche, completamente rasate per consentire la realizzazione delle strutture più recenti. L'ambiente di epoca romana è di forma quadrangolare e presenta, sul lato nord, una vasca rettangolare pavimentata con marmi completamente spoliati. A sud è stato possibile mettere in luce una porzione del piano pavimentale in *opus sectile*, di cui sono state riconosciute le impronte lasciate nella malta preparatoria. La campagna del 2026 si concentrerà nell'ultimazione dello scavo dell'ambiente, in modo da chiarire la planimetria e le vie di comunicazione tra l'ipotetico *frigidarium* e il *calidarium*, nonché l'intero sviluppo del complesso termale.

Sempre nel 2025 sono stati realizzati due saggi di scavo nell'area immediatamente a sud del grande peristilio, dove era parzialmente visibile un corridoio voltato. L'ambiente ha un andamento a L e risulta murato in epoca moderna alle estremità sud e nord, dove sono presenti due aperture antiche; il piano di calpestio del corridoio si trova a circa 1,5 m più in basso rispetto all'attuale piano di frequentazione esterno,

³ Il saggio si estende per 6,90×6,65m.

presupponendo l'esistenza di ambienti con piani pavimentali più in basso. Inoltre, a nord del corridoio sono visibili le creste murarie di alcune strutture forse pertinenti alla prosecuzione del corridoio, che sembrano costituire il muro di fondo di un grande ambiente quadrangolare, aperto sul braccio meridionale del peristilio orientale della villa.



Fig. 2- L'area dell'ipotetico *frigidarium* al termine delle indagini

I saggi sono stati posizionati a nord e sud del corridoio e hanno permesso di individuare una complessa sequenza di attività edilizie. Sul lato nord, dove il corridoio definisce una sorta di ampia esedra quadrangolare, è stata messa in luce la preparazione di una pavimentazione in *opus sectile*, asportata in epoca moderna, nonché un ampio basamento per un gruppo scultoreo (Fig. 3). L'ambiente sembra costituire un'ampia nicchia quadrangolare aperta su un più ampio ambiente non ancora indagato. I lati sud e ovest sono confinanti con il corridoio, con cui ha in comune i muri perimetrali in opera reticolata. Su questo lato la struttura muraria era interamente rivestita in lastre di marmo, almeno fino a circa 2 m di altezza dal piano pavimentale; a seguito degli interventi di scavo di epoca moderna, risalenti presumibilmente all'Ottocento, in base al rinvenimento nello strato di oblitterazione dell'ambiente di una pipetta in terracotta, il rivestimento è stato completamente asportato.

L'estensione dello scavo non ha permesso di mettere in luce in maniera completa i limiti della nicchia, né del basamento che si colloca sul fondo della stessa. Tuttavia, sulla base delle evidenze riscontrate, è ipotizzabile un'estensione dell'ambiente per almeno altri 2 metri, arrestandosi in corrispondenza di una struttura muraria in opera reticolata, di cui è visibile la cresta muraria.

Dell'originario rivestimento del piano pavimentale e delle pareti non è stato asportato un listello in ardesia, che correva alla base del rivestimento marmoreo parietale, lasciato in situ presumibilmente perché ritenuto di poco pregio.

A sud del corridoio voltato, invece, è stato possibile indagare una piccola area di scavo, lavorando sia immediatamente a sud-est dell'ingresso al corridoio sia al di sopra dello stesso.



Fig.3 - Il piano pavimentale in *opus sectile* e il basamento

In questo settore sono stati rimossi gli strati di obliterazione moderna dal piano pavimentale dell'estradosso del corridoio, mettendo in luce una sequenza di tre piani in malta cementizia. La più superficiale è riferibile a epoca moderna, mentre le altre sono di complesso inquadramento cronologico.

Il saggio principale è quello che ha interessato il settore immediatamente antistante il corridoio voltato; esso si estende per una larghezza di 3,90 m. e una lunghezza di 4,50 m. In questa area è stato individuato un ambiente, indagato per una larghezza di 2,65×1,50 m, estendendosi sul lato orientale oltre i

limiti di scavo. È stato possibile riconoscere più fasi edilizie, di cui l'evidenza più antica è costituita da una soglia lavica connessa con un pilastro in opera vittata. Di questa fase non è stato individuato il piano pavimentale.

In un secondo momento l'ambiente viene chiuso sul lato meridionale da una struttura muraria in opera reticolata, a cui si associa un piano pavimentale in cocchiopesto. In una terza fase di vita dell'ambiente, l'originario accesso è obliterato dalla realizzazione di una possente struttura muraria, ad angolo, in opera testacea. Il lato settentrionale della struttura va a porsi all'interno del corridoio voltato, riducendone l'estensione; su questo lato, inoltre, è presente un'apertura, forse funzionale all'accesso all'ambiente a seguito della chiusura dell'originario limite, non indagato, in quanto oltre il limite di scavo. Sul piano pavimentale del nuovo ambiente viene collocato un deposito intenzionale di anfore di tipo Dressel 2-4, posizionate sdraiate sul piano pavimentale, su più file (Fig. 4). Il deposito sembra esser stato realizzato in modo da sfruttare appieno la disponibilità di spazio dell'ambiente; nella porzione indagata sono state individuate e scavate 19 anfore integre, collassate al di sotto del peso del crollo delle strutture murarie dell'ambiente. Al di sopra del crollo, che testimonia il primo momento di abbandono dell'ambiente, è stato rinvenuto un



Fig.4 - Il deposito di anfore in corso di scavo

deposito antropico, ricco di elementi architettonici e strutturali non in connessione, funzionale forse ad una definitiva sistemazione dell'area.

Nel corso della campagna è stato possibile rilevare e documentare anche il corridoio voltato, in seguito alla rimozione delle strutture moderne di chiusura degli accessi. Il corridoio è stato rifunzionalizzato in epoca moderna tramite la creazione di una scala per consentire il superamento del dislivello tra interno e esterno, posizionata sul lato sud; in epoca moderna è stato pertanto frequentato come presumibile area di deposito e ricovero, intervenendo anche sul rivestimento parietale, parzialmente ricoperto da una nuova pellicola pittorica.

Anche in questo settore proseguiranno le indagini nel 2026, completando lo scavo dell'ambiente di epoca romana oblitterato dal deposito di anfore, nonché scavando il settore ad occidente della scala di accesso al corridoio voltato.

BIBLIOGRAFIA

Giglio, M., A. Bosco, R. Valentini, C. Mattei, I. Di Tano, M. Cuomo, F. Baiano (2022) Nuove ricerche nel settore termale e del cd. vigneto della villa imperiale del Pausilypon di Napoli. *Archeologie tra Oriente e Occidente* 1, pp. 23-41.

Mattei, C. (2023) Villa Imperiale del Pausilypon - Campagna di indagini 2023. *Archeologie tra Oriente e Occidente* 2, pp. 1-4.

Food, Fire, and Ovens: New Archaeological Discoveries at Al Baleed from the Italian Archaeological Mission (2024 Season)

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Abstract

The excavation activities of the Italian Archaeological Mission of the University of Naples L'Orientale at Al Baleed (IAMOB), carried out during the November-December 2024 campaign, focused on mound BA017. This area, which had never previously been subject to archaeological investigation, is located central-western part of the site, near the citadel and the Great Mosque. For the first time at Al Baleed, the ancient city of Zafār, a well-preserved production area dedicated to food preparation and cooking was uncovered. Likely part of a larger complex, the area revealed seven freestanding clay ovens (*tannurs*), hearths, ash pits, and installations for food processing. Associated finds included bread moulds, incense burners, pottery vessels, and personal ornaments. These artefacts suggest that the area was active between the 17th and 19th centuries, corresponding to the final occupational phases of the town.

Keywords: Al Baleed, Islamic Archaeology, *tannur*, Archaeology of Dhofar, Sultanate of Oman

Citation: Giunta, R. *et al.*, Food, Fire, and Ovens: New Archaeological Discoveries at Al Baleed from the Italian Archaeological Mission (2024 Season), *Archeologie tra Oriente e Occidente*, vol. 3-4, pp. 31-43, <https://doi.org/10.6093/archeologie/13092>

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The fieldwork of the Italian Mission took place from November 28 to December 26 2024, under the coordination of A. Pavan, Deputy Director of the Italian Archaeological Mission of the University of Naples L'Orientale at Al Baleed (hereafter IAMOB), in the southern Governorate of Dhofar.¹ The research carried out during this campaign led to the completion of the excavation of the religious complex discovered at the centre of the site (BA074), which had been initiated during the 2021-2022 campaign, and opened new trenches in the central-western area (BA017), a few meters south of the citadel and the Great Mosque (Fig. 1).



Fig. 1 - Aerial view of the site; the red squares indicate the two excavated areas (after Zarins, Newton 2012, fig. 2)

The religious complex

The religious complex, uncovered over three campaigns carried out between December 2021 and January 2024, includes a prayer hall (15.70×16.20 m)² – originally supported by 16 columns holding a flat roof – with a *mihṛāb* of semi-elliptical plan (1 m wide and 67 cm deep), and a rectangular minaret

¹ The team, supported by six workers, included A. Antonelli, D. Colagrossi, C. Passaro, R. Valentini, and an external collaborator, M.A. Al Hadri, whose participation was arranged in agreement with representatives of the Archaeological Park. R. Giunta, Director of the Mission, was unable to take part in the excavation campaign.

² The perimeter of the prayer hall of the mosque was firstly identified by Costa (1979/1982, 119, fig. 6).

(4.10×3.30 m), a small burial enclosure with six tombs, and an area for ablutions (Fig. 2). The excavation of the latter was completed during the last 2024 campaign. The mosque-minaret-funerary space complex stands on a platform approximately 1 m above street level and 4 m above sea level, featuring two staircases on the northern side. Elevating mosques on artificial platforms of varying heights is a typical feature in Dhofar and some other regions of Oman (Costa 2001).³

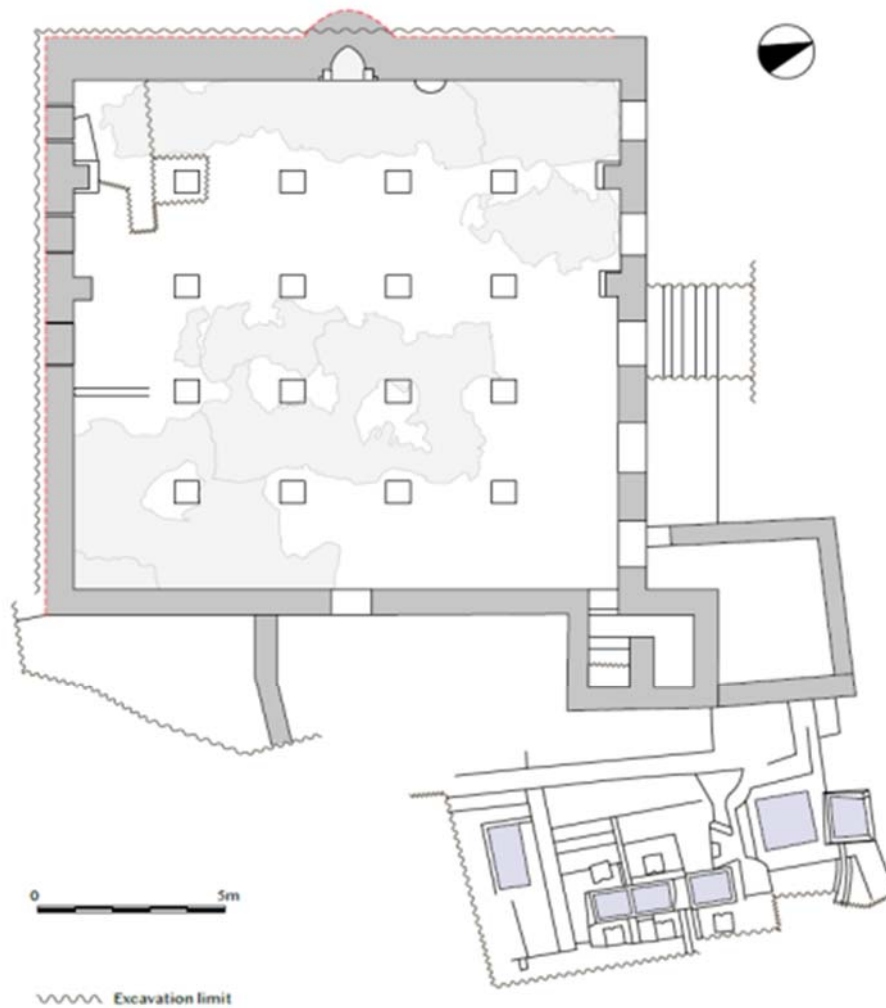


Fig. 2 - Plan of the religious complex (drawing by C. Passaro, ©IAMOB 2024)

In the area set aside for ablutions (50 m²), five carefully built stone basins were identified, their inner surfaces coated by a thick layer of waterproof plaster. Nearby, a well was found alongside the remains of an additional basin that seems to have served for watering animals. The five central basins were ingeniously connected through a series of openings placed at different heights, creating a drainage system that allowed water to circulate from one to another by means of small channels (Fig. 3).

³ For preliminary information, see Giunta, Pavan (2022, 2-3); Giunta (2024, 112-116); Giunta, Pavan (forthcoming *a*). A monograph dedicated to the entire complex is currently in preparation.

Following the discovery of this installation, a wider survey was conducted to document ablution areas in the immediate vicinity of other mosques across the site. This investigation revealed several recurring features and structural patterns, including the arrangement of basins, the use of hydraulic plaster, and the orientation of water channels. These shared characteristics indicate that similar design principles were consistently employed throughout the settlement. Their full significance, however, remains to be determined and will be the focus of dedicated analysis in forthcoming research.

Based on the archaeological and architectural evidence, and particularly on the ceramic finds, the complex has been dated to the period of Rasulid control over the region (13th-15th century).



Fig. 3 - Aerial view of the ablution area (©IAMOB 2024)

The excavation of mound BA017

The new mound selected for investigation was identified during the July 2024 study season, in coordination with representatives from the Ministry of Heritage and Tourism (MoHT) in Salalah. The choice was based on several factors: the substantial size of the mound (approximately 600 sq. m.), its high elevation above sea level (approximately 8.7 m), its previously unexcavated state, and its strategic location - 105.86 m south of the citadel, 40.63 m southwest of the Great Mosque, 75.49 m southeast of the eastern gate, and 103.15 m northeast of the southern gate (Fig. 4). The mound, designated as BA017 following GPS mapping carried out in 2019 by R. Valentini, is located at coordinates 194435.148N, 1882406.235E WGS84/UTM 40N zone.

Consideration was also given to the availability of a large adjacent area suitable for unloading and storing stones and excavation debris (Fig. 5).

The significance of this area had previously been noted by Michael Jansen's team from Aachen University, who proposed it as a potential "Residential Area" and carried out a series of exploratory trenches to the immediate north of the mound in 2000.⁴



Fig. 4 - Mound BA017 and its distance from the main buildings of the western area (Elaboration from Google Earth, ©IAMOB 2025)

⁴ Trenches 1-8; *loci* 700 to 708, see Jansen 2015, 232-233, 235-236. See also Giunta, Pavan (forthcoming b).

In the months immediately preceding the campaign, the authorities of the Archaeological Park and the Municipality of Salalah arranged for personnel and equipment to clear the dense vegetation that had grown, especially following the heavy rains recorded between June and August 2024. The superficial stratigraphic unit (SU1) was subsequently removed. This layer consisted of a few masonry blocks and stones of various sizes mixed with sandy material, the result of wind action that had deposited sand from the nearby beach onto the top of the mound.



Fig. 5 - Aerial view of the investigated area at the beginning of the works (©IAMOB 2024)

The removal of this surface deposit allowed for the exposure of the upper portions of two walls (W1 and W2), which had already been partially visible prior to the start of the excavation. No significant structural collapses were recorded, likely due to the systematic reuse of building stones from the site for the construction of buildings in the city of Salalah.⁵ A layer containing a small number of masonry blocks (SU3) was recorded west of wall W2, possibly resulting from the collapse of the wall following the area's abandonment and the subsequent looting of construction materials. Excavation continued with a 2×1.5 m trench (DS1), which was soon expanded to allow for a clearer understanding of the area. Stratigraphic units SU2 and SU4, both sandy in composition and rich in finds, were removed. These units yielded numerous ceramics, animal bones, vertebrae with fish scales, and various objects. The removal of these layers made it possible to define the perimeter walls of rooms A1 and A2 (W1, W20, W3, W25, W24, and W2, listed clockwise from the south), and to identify hearth SU14, located in the corner between W5 and W2. This hearth contained large bones, likely of cattle. During the same phase, two free-standing clay ovens (*tannurs*) were brought to light: SU21 and SU26, along with their respective fills, SU22 and SU27.

Work then focused on the two main rooms, where the small collapse layer SU19 was removed. This deposit had blocked the passage between W5 and W9 and covered both the low wall W12-composed of a single row of blocks-and the ovoid structure W13 (Fig. 6), which had obliterated a third oven (SU29), and belongs to the latest occupational phase. Following detailed photogrammetric documentation, these structures were dismantled. The presence of ash immediately beneath the surface suggests that cooking activities continued during this latest phase, although in a less organized manner compared to the previous one, which was



Fig. 6 - Ovoid structure W13 obliterating *tannur* SU29 (©IAMOB 2024)

⁵ This practice continued until the 1970s, when the ruins were finally enclosed by a metal fence and designated as a protected archaeological area.

characterized by a high concentration of ovens, hearths, and food-processing installations. Both phases appear to be chronologically close, sharing the same ceramic assemblage.

The removal of the most recent features clarified the layout of the central area, originally rectangular in shape and later subdivided by the construction of walls W10 and W9 (abutting W3) and the pillar W5 (built against W2), which framed the opening between rooms A1 and A2. At this point, all *tannurs* and hearths were identified, along with floor SU38, corresponding to the occupation level associated with the cooking activities.

Excavation was then extended eastward, uncovering rooms A4 and A3, originally one single room, later divided by wall W11 and platform SU55, the latest potentially associated with use as a work surface, as well as A5, defined to the north and west by walls W18 and W3, whose southern and eastern limits are yet to be defined. Floor SU57 was exposed, supporting ovens SU50 and SU31 (with respective fills SU51 and SU32), and an expansion of the oven SU31 (SU42 with fill SU41).

At the eastern edge of the excavation area, installation W19, likely associated with shellfish processing, was discovered beneath SU43 (Fig. 7). The trench was also extended westward, where another minor collapse layer (SU39), similar in composition to SU43 but less rich in material, was removed. The presence of ash lenses in this sector (A6) suggests the possible existence of production installations similar to those identified in A1, A2, and A5, which will require further investigation in the next excavation campaign. In the final week of fieldwork, room A7 was also defined, enclosed by walls W21, W4, W1, W14, and W22 (clockwise from the south). However, due to time constraints, excavation was limited to a superficial level, insufficient to determine the nature of the deposit or the function of the room.

By the end of the excavation, the investigated area covered approximately 200 sq. m., with boundaries measuring roughly 15×12 m (Fig. 8).



Fig. 7 - Installation W19, associated with shellfish processing (©IAMOB 2024)

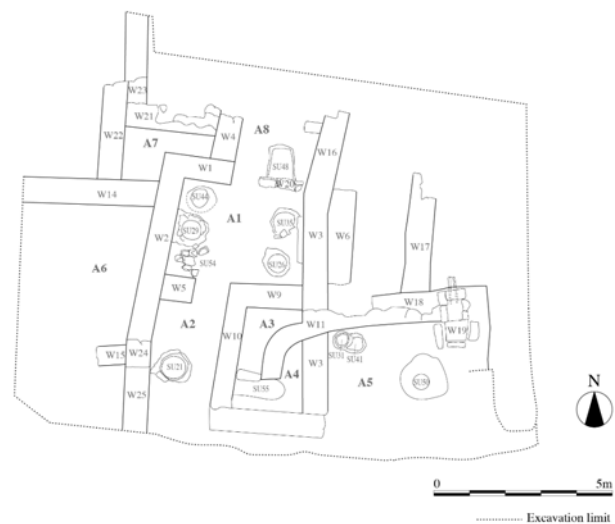


Fig. 8 - Plan of the excavated area (drawing by C. Passaro, ©IAMOB 2025)

The area clearly represents only a portion of a larger complex extending to the north, east, and west of the excavated sector. The size and number of installations suggest that this was a large-scale production

centre, likely intended to serve a substantial number of people - possibly functioning as an industrial facility or a public kitchen supporting the Great Mosque or the citadel.⁶

The excavation uncovered seven *tannurs* (SU26, SU29, SU35, SU22, SU31, SU44, SU50), slightly conical in shape and with a large opening at the top of the cone (Figs. 9, a-g).

These structures are well attested across the Near East, with documented occurrences spanning all major chronological phases from the Neolithic through the Late Islamic period (Rova 2014). They are still in use today, often built in clay in rural areas and in alternative materials in urban contexts (Mulder-Heymans 2002).

Six *tannurs* are positioned directly on the floor surface; one of them (SU44, Fig. 9, f) was cut into the floor level (SU38floor), with its base lying below the surrounding walking surface. In contrast, *tannur* SU50 (Fig. 9, g) exhibits a double-skin construction, consisting of two concentric walls that may represent a repair technique used to reinforce or restore a previously damaged oven.

The ovens' diameters range from 30 cm (SU31) to 64 cm (SU22), with a maximum preserved height of 50 cm (SU50). These dimensions are consistent with standard measurements for this type of oven, which typically have a height of less than one meter and base diameters between 40 and 60 cm (Rova 2014, 122). Wall thickness varies between 3.5 and 5 cm. No vent hole was identified at the base of the cones, aligning with most archaeological evidence and in contrast to modern *tannurs*, which usually feature an opening to facilitate internal cleaning (Rova 2014). Several of the ovens are surrounded by small stones, likely serving as a foundation and contributing to heat retention. SU31 includes an extension, probably intended for storing and gradually feeding fuel, most likely brushwood, straw, or dung cakes. The ovens were used for both bread and fish preparation, as indicated by the contents of their fills. The exclusive presence of ash is typically associated with bread baking - particularly a type of flat, circular bread that detaches from the oven walls when fully cooked. Conversely, the presence of fish bones and scales points to the use of some ovens for cooking fish.

Inside the fill (SU51) of *tannur* SU50, a fragmentary cooking pot was also found, resting at the bottom of the oven. Notably, the fill (SU30) of *tannur* SU29 is characterized by the absence of ash and the presence of stone fragments within a coarse, brown-yellowish soil matrix.



Fig. 9 - The seven *tannurs* (a-g) discovered during the archaeological campaign (©IAMOB 2024)

⁶ Excavations at the citadel did not reveal any evidence of kitchens or food preparation areas. However, it should be noted that the investigations did not reach the ground floor level, where such spaces were likely located. In addition, the quantity of finds associated with food consumption was very limited (Pavan forthcoming).

At the edge of the main room, small pits dug into the floor were found, likely used to collect ashes from the ovens after cleaning. This is exemplified by pit SU56, located near *tannur* SU44 and SU24 near *tannur* SU26. Generally, after each use, the ashes left inside the oven were pressed down onto its floor until they reached a certain level, at which point they were scraped out and removed - often ending up in the pits dug into the floor for this purpose.

A couple of hearths (SU14 and SU54), consisting of simple, irregular stones arranged in a poorly preserved circular layout, were also discovered.

It is not possible to determine with certainty whether the ovens were located indoors or in an open space. However, considering the number of *tannurs* (which may not have all been in use simultaneously) and the presence of hearths within a relatively small area, it is plausible that the ovens were situated in an open or semi-open space, possibly enclosed by low walls and topped with perishable materials (Fig. 10).⁷



Fig. 10 - Virtual reconstruction of a portion of the main room with the freestanding *tannur* SU29, the dug-in oven SU 44, and the hearth SU54 (virtual reconstruction by C. Passaro, ©IAMOB 2024)

However, the area does not appear to have been intended solely for baking activities, but also for food processing. Specifically, to the east of the trench, a feature was identified consisting of a rectangular basin measuring 52×58 cm, connected to a 40×46 cm work surface built against wall W18. The basin was linked to a 76 cm long limestone channel that passed through wall W18. This channel led to a refuse pit, and within its fill (SU47), numerous object fragments and a large quantity of bivalve shells were found, suggesting that the molluscs were processed in the basin and subsequently discarded through the channel into the pit on the opposite side of the wall.

The absence of burn marks suggests that the molluscs were likely boiled near the basin – possibly in *tannur* SU50 – and that the separated shells were flushed through the channel into the refuse pit (Fig. 11).⁸

⁷ Given the impossibility of providing protective coverings for the investigated area, and in agreement with the authorities of the Archaeological Park, the *tannurs* were secured at the end of the activities with a layer of geotextile, followed by stones and soil, in order to ensure their preservation.

⁸ Four buckets of soil from the fill of pit SU47 were sieved to assess the potential presence of mollusc species and to initiate a malacological study aimed at identifying the taxa and reconstructing their possible uses or processing methods. The study will be conducted over the summer as part of a new collaboration with Dr Gaia Crippa of the University of Milan, Department of Earth Sciences “Ardito Desio”.

Within the fill of the larger basin, just below surface SU1, in layer SU43, an unglazed jug (SU43.1) was found (Fig. 12).



Fig. 11 - View from the north of the drainage channel of feature W19 (©IAMOB 2024)



Fig. 12 - The unglazed jug SU43.1 (©IAMOB 2024)

The vessel appears to be handmade and likely originated in Central-Eastern Africa. Measuring 30cm in height, with a rim diameter of 6.8 cm and a base diameter of 5.6 cm, the jug features a series of grooves of varying depth, created using the combing technique.⁹

Also potentially related to food preparation or serving practices is SU48, which consists of an inclined surface with a packed clay base, bordered on three sides by a thick, high clay edge. To the south, this edge possibly abuts wall W20, although further investigation is needed to confirm this relationship.¹⁰

The hypothesis that the area was used to prepare food that was then served immediately is supported by the types of ceramic material found in large quantities.¹¹ Most of the ceramics are of local manufacture, characterized by distinctive spouts, knobbed handles, and red-painted decorations alternating with incised patterns (Fig. 13).¹² These are accompanied by imported artifacts, including a large olive green glazed bowl with a plain rim, oblique walls, and a ring base (SU8.1), produced in Bahla, northern Oman. Excavations also uncovered a significant number of East Asian imports - mainly Batavia ware cups and small blue-and-white porcelain tea or coffee cups (Fig. 14).

⁹ Two irregularly shaped holes (measuring 2.2 cm and 1.5 cm in diameter) are visible at the base of the vessel. These may have been intentional, although their function remains unknown.

¹⁰ Said Al Amri suggested a possible interpretation of the structure as a surface used for placing freshly baked bread, based on a similar feature he observed in a mountain village north of Salalah.

¹¹ Due to time constraints, not all of the ceramics recovered during the excavation were examined; only those from selected stratigraphic units – specifically SU4, SU8, and SU11 – were taken into consideration.

¹² For further information on this ceramic ware found at Al Baleed, see Fusaro 2021, 82-83.



Fig. 13 - Local pottery from SU8 (©IAMOB 2024)



Fig. 14 - Batavia ware and Blue and White porcelain cups from SU8 (©IAMOB 2024)

Notably, several bowl fragments exhibit a cracked exterior surface, which C. Visconti (2021, 106) suggests may originate from Thai or Vietnamese kilns that produced wares often accompanying Chinese exports. Both the locally produced ceramics and the imported wares collectively date the area's primary use to between the 17th and 19th centuries, aligning with the final occupational phase of the citadel¹³ and, thus far, of the town itself (Pavan 2021).

A total of 70 small finds¹⁴ were collected during the excavation, most of which are related to food processing and preparation. These include a considerable number of pestles, grinding stones and slabs, numerous whetstones, and a couple of iron blades. Particularly noteworthy is the discovery of two fragments from distinct circular bread moulds (Fig. 15) – more accurately described as bread presses – which are emblematic of Dhofari baking traditions that continue to be practiced today.¹⁵ The final product appears to have been a thin, unleavened bread of the *qalib*¹⁶ type, characterized by a crisp texture. The baking technique involved applying the dough directly to the interior wall of a *tannur*.¹⁷

¹³ For the analysis of the East Asian ceramic assemblage related to the final phase of the city's occupation, see Visconti 2021; for the local assemblage, see Fusaro 2021.

¹⁴ A total of 36 objects or fragments in clay, 13 in glass, 12 in worked stone, three in shell, and five in metal (including three in copper alloy and two in iron) were recovered, along with one illegible coin and a dome-shaped plaster element of unknown function.

¹⁵ For a comparison of the bread moulds with recent samples, see Richardson, Dorr 2003, vol. 2, 507, no. 465.

¹⁶ The term *qalib* refers to the act of placing or shaping the dough within a mould.

¹⁷ See also <https://mariellerisse.com/2020/02/15/bread-in-dhofar/> for a description of the bread-making traditions in the region.



Fig. 15 - Decorative bread moulds (©IAMOB 2024)



Fig. 16 - Some personal items in copper alloy (©IAMOB 2024)

Numerous fragments belonging to a well-known type of elongated incense burner – featuring four vertical legs supporting a receptacle – have also been identified. For the first time in this context, one example was found still associated with its base. These pieces are made of Red Ware or Shell Ware and are decorated with red-painted bands and various motifs. This type of incense burner, clearly locally produced, finds numerous parallels in the earthenware assemblage characteristic of the sixth and final occupational phase of the Citadel (17th-19th century; Pavan *et al.* 2020, 170, fig. 4b). Similarly, fragments of oil lamps were recovered, along with one intact specimen, which shows soot traces mainly concentrated near the pinched rim and a surface finish limited to wet smoothing. Some personal items were also found in unusual contexts, such as in the fill (SU22) of *tannur* SU21 – where an earring with a string of chained, hanging rings and a nose earring were discovered – or in the garbage pit containing mollusc shells (SU47), where pendant was found. The latter may have been used to contain perfume, and possibly ambergris in particular (Fig. 16).¹⁸

Fragments of glass bangles, the finial of a sprinkler, rims of bottles, and umbonate bases from large containers were also recovered. Despite their extremely fragmentary condition and weathered surfaces, it was possible to reconstruct most of the original shapes of the glass artefacts.¹⁹

For the topographic positioning of the uncovered structures, a new simple survey network with only 4 pegs was established (Fig. 4). The survey was carried out using a Topcon MG50 total station provided by the Al Baleed Park and was based on the previous one. Near the identified area, a benchmark from the previous networks, benchmark 100, was detected. This was used as the origin point for the new network established in 2024. Orientation for the correct roto-translation was carried out using benchmarks 300 and

¹⁸ The hypothesis that it could be some form of pomander was first put forward by D. Colagrossi. Chemical analyses will be conducted in collaboration with the Department of Chemistry at the University of Pisa to determine the material contained inside.

¹⁹ The glass finds, like the other artefacts found during the excavation, are compatible with the assemblage uncovered in the last occupational phase of the citadel and of the town (1600-1800). The study of the glass artifacts from the citadel has been object of the unpublished thesis by A. Antonelli (2024) for the Post-Graduate High School in Archaeology OrSa, (University of Salerno - L'Orientale University of Naples).

600 from the previous network. Additionally, a new benchmark (st5) was established to be used in case the extension of the excavation – including the area of benchmark 100 – requires its removal.

At the end of the archaeological campaign, thanks to the collaboration of Said Al Amri, Site Supervisor at the Al Baleed park for the Ministry of Heritage and Tourism, an aerial photogrammetry survey was carried out (Figs. 17-18) to produce a digital twins of the new structures uncovered.

A total of 89 cameras were calibrated using Pix4D software, generating a point cloud of over 17 million points with a sub-centimetric GSD (0.186 cm/pixel; Minucci 2018, 94). The model, aligned with the topographic network, provides real measurements and serves as the basis for the plans and scaled reconstructions presented in this article.



Fig. 17 - The path flight for photogrammetric acquisition (©IAMOB 2024)



Fig. 18 - Point cloud from photogrammetric survey (©IAMOB 2024)

Future activities

The area that the Mission has begun to investigate is gaining significance, particularly as it appears to be the first food processing and cooking production area identified so far within the entire site. The primary objective of the upcoming autumn campaign is therefore to continue the excavation of the mound, which will be extended northward to re-establish continuity with the trench opened by M. Jansen in 2000 (Jansen 2015, 232-233, 235-236),²⁰ and will also be expanded both eastward and westward. The ash lenses uncovered in the western sector (A6) suggest that similar production installations may extend in that direction. Conversely, to the south, the site appears to have been affected by an as-yet-undetermined event that obliterated the ruins, as no trace of the southern wall has been preserved.

Future work will also focus on an in-depth study of the small finds and ceramic assemblage, which will be fully documented and analysed to reconstruct their contextual associations and usage dynamics. In parallel, significant emphasis will be placed on archaeobotanical investigations, particularly through the analysis of sediments collected from the *tannur* fills. The aim is to gain insight into both the types of food prepared and the fuels used to fire the ovens. Concurrently, targeted research will be conducted on the animal bones and shells recovered from the site. These studies are expected to provide key insights into the diet and eating habits of the inhabitants of ancient Zafār, thereby contributing an essential element to our broader understanding of their daily life and interaction with the surrounding environment.

²⁰ The perimeter of this trench is still identifiable by its geotextile lining.

Acknowledgements

This mission was made possible through funding from the Italian Ministry of Foreign Affairs and International Cooperation (MAECI), the University of Naples L'Orientale (Unior), the Interdepartmental Service Centre for Archaeology (CISA), and the International Association for Mediterranean and Oriental Studies of Rome (ISMEO). We are also grateful for the logistical support provided in Oman by Ali Al Kathiri, Director of the Land of Frankincense Sites Department; Said Al Amri, Supervisor of the Al Baleed Archaeological Site, who provided invaluable assistance with drone photography; and Mohammed Al Jahfali, Assistant Director of the Frankincense Land Sites Department. We further acknowledge the essential support offered by the Omani Ministry of Heritage and Tourism (MOHT). Finally, the team extends its thanks to Warda Al Shahri of the Museum of the Frankincense Land for her collaboration, particularly in the careful preliminary cleaning of artefacts and the conservation treatment of selected ceramic pieces.”

REFERENCES

- Antonelli, A. (2024) *Vasellame in vetro dagli scavi del sito archeologico di Zafār/al-Balīd (Dhofar, Sultanato dell'Oman)*. [Unpublished MA Thesis].
- Costa, P.M. (1979/1982) The Study of the City of Zafār (al-Balīd), *The Journal of Oman Studies* 5, pp. 111-150.
- Costa, P.M. (2001) *Historic Mosques and Shrines of Oman* (BAR International Series 938). Oxford.
- Fusaro, A. (2021) The History as Told by the Pottery: An Insight into the Last Occupation Phase of the Citadel of al-Balīd, *Newsletter di Archeologia CISA* 12, pp. 81-99.
- Giunta, R. (2024) The Omani Mosques and the Mosque Unearthed by the Italian Archaeological Mission at Zafār/al-Balīd, in the Dhofar Region, *Annali dell'Istituto Universitario Orientale, Sezione orientale* 84, pp. 106-119.
- Giunta, R., A. Pavan (2022) First Archaeological Activities by the University of Naples L'Orientale in Dhofar, Sultanate of Oman, *Archeologie tra Oriente e Occidente* 1, pp. 1-10.
- Giunta, R., A. Pavan (forthcoming a) A Rasulid Mosque at Al Baleed: New Excavations and Interpretative Perspectives, *Athar: Bulletin of Archaeological Research in the Sultanate of Oman* 2 (Season 2023-2024).
- Giunta, R., A. Pavan (forthcoming b) Al Baleed: New Discoveries from the Central-Western Area of the Site, *Athar: Bulletin of Archaeological Research in the Sultanate of Oman* 3 (Season 2024-2025).
- Jansen, M. (2015) *The Archaeological Park Al-Baleed, Sultanate of Oman. Site Atlas along with Selected Technical Reports 1995-2001*. Muscat.
- Minucci, E (2018) APR e Droni nella moderna ricerca archeologica: un primo approccio, *Newsletter di Archeologia CISA* 9, pp. 91-114.
- Mulder-Heymans, N. (2002) Archaeology, Experimental Archaeology and Ethnoarchaeology on Bread Ovens in Syria, *Civilisations. Revue internationale d'anthropologie et de sciences humaines* 49, pp. 197-221.
- Pavan, A. (2021) A Sentinel on the Indian Ocean: The Citadel of al-Balīd (Excavations 2016-2020), *Newsletter di Archeologia CISA* 12, pp. 23-46.
- Pavan, A. (forthcoming) *Sentinel of the Arabian Sea: The Medieval Citadel (Husn) of Al-Balid (Salalah, Dhofar)*. Oxford.
- Pavan A., A. Fusaro, C. Visconti, A. Ghidoni, A. Annucci (2020) New Researches at the Port of Al Baleed and its Castle (Husn): Interim Report (2016-2018), *The Journal of Oman Studies* 21, pp. 172-199.
- Richardson, N., M. Dorr (2003) *The Craft Heritage of Oman*, 2 vols. Dubai.

Rova, E. (2014) Tannurs, Tannur Concentrations and Centralised Bread Production at Tell Beydar and Elsewhere: An Overview. In L. Milano (ed.), *Paleonutrition and food practises in the Ancient Near East. Towards a Multidisciplinary Approach*, pp. 121-170. Padova.

Visconti, C. (2021) Chinese-Style Ceramics Unearthed at Ẓafār/ Al-Balīd: A General Overview of the Corpus and a Focus on the Latest Period, *Newsletter di Archeologia CISA* 12, pp. 101-116.

Zarins, J., L.S. Newton (2012) *Al Baleed: Ancient Zafar, Sultanate of Oman. Report of excavations, 2005-2011 and Salalah Survey*. [Unpublished Report, Office of the Adviser to His Majesty the Sultan for Cultural Affairs]. Muscat-Salalah.



2024 Season of the University of Naples L'Orientale at Wādī Banī Khālid. From the Excavation to Conservation and Valorisation

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Abstract

Since 2019, the University of Naples L'Orientale project at Wādī Banī Khālid has been conducting archaeological research under the patronage of the Italian Ministry of Foreign Affairs and International Cooperation and the Oman Ministry of Heritage and Tourism (MHT). The main research topics focus on mapping archaeological evidence dating from the prehistory to the Late Iron Age and examining its relationship with the coastal environment, particularly the coastal strip between Bamah and Tīwī. Furthermore, archaeological excavations are focused on the main Iron Age settlement (WBK1) and the newly discovered secondary fort (WBK49). Finally, a conservation and valorisation project, within the framework of the MHT's efforts to foster a local economy based on sustainable tourism, was launched in 2022, beginning with initial conservation measures and progressing toward the digital valorisation of the archaeological sites.

Keyword: Conservation, Valorisation, Wādī Banī Khālid, Sultanate of Oman, Iron Age, Gamification, Digital Humanities

Citation: Loreto, R. *et al.*, 2024 Season of the University of Naples L'Orientale at Wādī Banī Khālid. From the Excavation to Conservation and Valorisation, *Archeologie tra Oriente e Occidente*, vol. 3-4, pp. 45-60,

<https://doi.org/10.6093/archeologie/13093>

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Introduction

The project in Wādī Banī Khālid, in the eastern Hajar Mountains, follows 9 years (2014-2022) of research along the coast between Quriyat and Sur (Bamah) and the mountainous areas of al-Hajar, to investigate the relationship between the coastal sites of the region and the larger agricultural oases in the interior, in order to reconstruct the socio-economic dynamics and settlement strategies of the 1st millennium BCE - 1st millennium CE, which are known only through Classical Greek and Roman sources (Loreto in press). This scientific approach proved particularly suited to the renewed Omani ministerial framework following the establishment of the MHT. In fact, on 19 November 2024, the Wakil (Deputy Minister) for the MHT, and subsequently, on 2 December 2024, the team of the Director General for Antiquities, during a field visit, approved the implementation of the conservation and enhancement strategy for the fortified site of WBK1 (4th century BCE - 2nd century CE) within the framework of the 2023-2027 agreement between the University of Naples L'Orientale and the MHT. Therefore, the project proceeded not only with the systematic excavation of the urban sites of Wādī Banī Khālid (WBK1 and the newly discovered WBK49) (Fig. 1), but also with the immediate restoration (consolidation) of the excavated structures, the creation of the first access routes within the WBK1 area, and the preliminary design of both a local museum (Antiquarium) and a digital dissemination system, including a virtual museum supported by a gaming platform. The physical and digital museums are conceived as complementary spaces: the former as a

tangible repository of the material culture unearthed in WBK, and the latter as an interactive environment enabling remote audiences to explore the archaeological landscape through immersive narratives and gamified experiences. In agreement with the MHT, the access staircase to WBK1 was inspected and certified and the first 160m of the visitors' pathways were built.

Remote sensing and field surveys

As usual, the project includes remote sensing activities for the complete mapping of the Wādī Banī Khālid catchment area, in order to produce a geoarchaeological remote sensing map as a preparatory tool for field exploration and to serve as reference documentation for the Omani Ministry of Heritage and Tourism (Loreto, Marcolongo 2023, 151-161). The 2024 campaign focused on the outermost stretches of the long watercourse, to the north, intercepting around a dozen structures that could be identified as shelters and referred to the Iron Age; and towards the south, where the results obtained were rather striking. Near the eastern alluvial conoid of the wadi, i.e. immediately at the foot of the mountains from where the wadi inundates the innermost areas of the al-Hajar, near Kamil wal Wafī, a substantial number of mound or turret-type tombs were identified, all of which are deployed on the foothills or on elevations (inselbergs) that stand out on the alluvial plain. The tombs are organised in clusters (i.e. necropolises) and there are at least 1.900 of them. A visit was conducted on 30/11/2024 and it was noted that the number of tombs is higher than what can be detected from satellite imagery, since numerous smaller examples cannot be detected through remote sensing. Given the location of this huge burial field, it is plausible that it was connected to Wādī Banī Khālid environment.

Excavations in WBK1

The excavations of 2024 confirm the results observed in 2023, i.e. that the northern wall sector presents the deepest stratigraphy: the newly identified building G/A, visible on surface (a circular structure 12m in diameter), is only the later dwelling phase, datable to the 2nd century CE; it is followed by at least a second phase still datable to the Late Iron Age (2nd century BCE - 1st century CE) and a further occupation phase datable to the Early Iron Age (6th century BCE). The excavation shed light on the nature of the fortifications. Indeed, the earliest phases do not include dwellings but rather a series of quadrangular casemates filled with ceramic (tableware and storage vessels) and chlorite artefacts. Approximately 6.000 ceramic fragments have emerged from the excavation of the lower levels, many of which can be reconstructed; during the campaign, four specimens were restored to provide reference material for the digital dissemination currently in preparation.

Excavation of WBK49

WBK49 (sector D), discovered in the 2023 campaign (Loreto in press), appears as a mighty fortress of approximately 80 x 40m protected by casemate walls and characterised by dwelling structures arranged in the centre and along the southern front, where the original access to the site is preserved (Figs. 1, 2). It was decided to start excavations in the vicinity of the dwelling structures (building A/D - 8x9 m – in the centre of the site and buildings B/D and C/D – a total of 24x8 m – on the southern front), while for the casemates that circumscribe the site it was decided to collect any material visible on the surface. The excavations lasted 10 days: the buildings present material that can be dated to the Late Iron Age, in particular to the 2nd century BCE - 2nd century CE, with many comparisons to WBK1 and referable to the Samad horizon.

In light of the number of materials collected (over 5.000 ceramic sherds), we are once again facing with a particularly rich habitation site that, together with WBK1, demonstrates the predominant role of Wādī Banī Khālid in the economy of eastern Oman during the Iron Age.



Fig. 1 - Plan of WBK1 and WBK49 (©University of Naples L'Orientale)



Fig. 2 - Aerial view of WBK1, from the east (©University of Naples L'Orientale)

Conservation and fruition strategies at WBK1

In the settlement landscape of the Iron Age in eastern Oman, the fortified site of Wādī Banī Khālid 1 (WBK1) represents one of the most complex and monumental examples identified so far. The settlement is located in the middle section of the wadi course, on a wide limestone terrace overlooking the underlying alluvial plain, in a strategic position for the control of water and agricultural resources. The geomorphological setting, already defined through geoarchaeological analyses and remote sensing, corresponds to a valley basin of about 250 km², structured in terraces and alluvial fans that, since the Iron Age, have supported the development of an “oasis-urban” economy based on the complementarity between agriculture and water management (*falağ*), pastoralism, and territorial control (Loreto, Marcolongo 2023, 150-160).

The fortified site of WBK1 covers an area of approximately c. 1.5 ha (c. 200×100 m) and features a regular layout enclosed by a defensive wall about 650 m long, punctuated by eleven towers set at regular intervals. The wall was built using large wadi cobbles, some up to 1 m in diameter, arranged in a double facing and filled internally with gravel and soil (Loreto 2020, 7-8). The preserved height reaches up to two meters on the northern side, where the natural slope ensures greater stability; by contrast, on the western side, vulnerable to talus erosion, the fortification is partially collapsed. The towers display alternating circular and quadrangular plans; some are integrated within the main wall, while others were added later, indicating at least two main construction phases.

The first corresponds to the original building phase, including the corner and main sectoral towers (T1, T4-T6); the second phase strengthened the defenses by adding new towers along the northwestern side and inserting an additional double curtain on the northern front.

The internal organization of the site, characterized by a “saddle-shaped” profile, shows a clear distinction between the northern sector, densely built-up, and the southern sector, more sparsely occupied and less compact (Fig. 1). In the northern area, numerous domestic units with rectangular or sub-circular plans can be identified, built using the same masonry techniques as the fortifications and directly resting on the rocky substrate, following a construction model common to Late Iron Age sites in central Oman, such as al-Moyassar M34 (Yule 1999, 129, fig. 7), Ṭīwī, Jabal Ṣunsunah (Yule 2016, 61, figs. 22-23), and Lizq (Kroll 2013, 38, fig. 33). The absence of true road axes or an orthogonal layout suggests an organic and incremental development of the “urban” plan, in which domestic spaces gradually adapted to the natural morphology of the slope and to the changing defensive requirements of the site.

Consolidation of excavated structures

The activities, initiated in 2019, adopted an integrated methodological approach aimed at combining the consolidation of archaeological structures with landscape enhancement and the preparation of the site for public access. Twelve architectural units, including towers, domestic areas, and partially collapsed wall sectors, were subjected to systematic excavation and conservation interventions. The entire process was preceded by a preliminary diagnostic phase and a degradation mapping, conducted in accordance with international guidelines for the conservation of porous materials (Torraca 2005, 83). During this phase, altimetric elevations, planimetric layouts, and damage maps were accurately recorded in order to document the pre-intervention state of preservation and to provide a reference framework for subsequent phases of intervention and monitoring.

The analysis of degradation phenomena revealed the widespread presence of collapses, superficial detachments, and loss of cohesion in the earthen binder, caused both by surface runoff from rainwater and by the abrasive action of wind and seasonal thermo-hygrometric fluctuations. This condition of fragility is

typical of the arid and semi-arid contexts of eastern Oman, where the clay component of sediments tends to disintegrate due to cyclical expansion and contraction. The construction technique at WBK1, based on unworked river cobbles laid dry and on beaten-earth floors, therefore required targeted action to protect both foundation levels and walking surfaces, following principles of minimal intervention and material compatibility, in accordance with the general ICCROM and ICOMOS guidelines.¹

The initial intervention strategies focused on protecting the foundation walls through the construction of low retaining structures. These were designed to respect the original geometry of the architecture, using only local cobbles collected from the wadi bed, with the aim of minimizing both the visual and mechanical impact on the ancient structures. The use of modern high-rigidity mortars was avoided and replaced with loose materials compatible with the original construction system.

For the beaten-earth floors, subject to pulverization and disintegration, a procedure successfully tested at the site of Dūmat al-Jandal (Saudi Arabia) was adopted (Loreto 2017). This involved the application of a natural 10% gum arabic solution diluted in water, applied in three consecutive cycles. Gum arabic, chosen for its low salt solubility,² its ability to form a breathable protective film,³ and its full reversibility,⁴ proved to be perfectly compatible with the physical and chemical characteristics of WBK1's building materials. Thanks to the soil's natural porosity, the organic substance was deeply absorbed, generating a stable and natural cohesive effect.

Tests conducted in 2022 and verified in 2024 approximately one centimeter and the continued activity of the consolidant, thus confirming both the durability of the treatment and its long-term compatibility with the original materials (Fig. 3).

In line with the principles of preventive conservation, the project included the implementation of a systematic monitoring and maintenance plan. All interventions were thoroughly documented through high-resolution metric and photogrammetric surveys, processed using *Agisoft Metashape* software to generate high-density, georeferenced 3D models. This approach allowed precise recording of the geometry of the consolidated structures, the detection of micro-volumetric variations, and the monitoring of possible deformations or material losses over time. The photogrammetric acquisition, integrated with close-range photography and aerial drone imagery, produced detailed documentation of the consolidation areas and treated surfaces, providing a comparative baseline for future stability assessments and evaluations of the conservation treatments' effectiveness.

A scheduled maintenance plan was also established, including the periodic cleaning of surfaces, control of salt efflorescence and superficial disintegration, localized filling of sediments in correspondence with gaps or erosions, as well as systematic photographic surveys at the end of each excavation season.

Conservation, in this perspective, is conceived as a dynamic and continuous process rather than a definitive intervention. The awareness that every consolidation action represents a temporary phase within a cycle of monitoring and periodic review constitutes one of the most innovative aspects of the WBK1 protection plan. In this sense, the intervention forms part of a broader strategy of landscape protection and integrated site management, in which the material safeguarding of structures is interwoven with visitor planning, risk mitigation, and environmental enhancement. This approach, consistent with international guidelines, recognizes that conservation is never "once and for all," but requires continuity, adaptability, and shared responsibility over time.

¹ Si vedano ICOMOS 1990, art. 3 e art. 5; Feilden, Jokilehto 1987, 61-66.

² For further details on the composition and properties of the Arabic gum, see Masschelein-Kleiner 1995, pp. 49-50.

³ *Ibidem*.

⁴ Regarding its characteristics and reversibility, see also the text *Adhesives* (Albro *et al.* 1989, 14-16).



Fig. 3 - The result of the 2022 test in 2024. Up, consolidated floor; down, not excavated floor (©University of Naples L'Orientale)

Access to the site

After identifying an appropriate solution to keep the residential areas clear and facilitate visitor accessibility, in 2023 the project initiated the construction of a stable and safe access system that would allow controlled entry to the site in harmony with the site's natural morphology (Fig. 4). The intervention area, located on the northwestern slope, features a steep incline covered with loose deposits, showing clear signs of surface instability and erosion caused by seasonal runoff. The geometric alignment of the staircase was defined through slope analysis and hydrological modeling, ensuring minimal interference with existing drainage lines. The intervention followed a principle of morphological compatibility, adopting gradients that respect the natural runoff to prevent future erosion and water stagnation.

The layout of the new pathway was defined following a topographic and photogrammetric survey, conducted to analyze the slope gradients and the configuration of the rocky substrate. Based on this analysis, a 45-metre-long access staircase was designed and positioned along the most stable portion of the slope. The structure is entirely built with medium- and large-sized local river cobbles, laid dry and laterally reinforced with gravel and wadi sand, ensuring effective drainage and adaptability to minor ground movements.

Each step was shaped according to the natural contour of the terrain, avoiding any cutting into the bedrock or the use of invasive anchoring. The intervention, fully reversible in nature, allows visitors to ascend comfortably to the western edge of the defensive wall, where the pathway directly connects to the internal walkways arranged for the exploration of the domestic and defensive structures.

Particular attention was also devoted to the visual integration of the staircase within the surrounding landscape: the materials, selected from those collected on site, replicate the natural hues of the soil and are almost indistinguishable from a distance. In this case as well, progressive photographic documentation was undertaken during construction, serving both for geometric verification and for the long-term monitoring of structural conditions.

Today, the pathway provides safe access to the site, reducing human impact and limiting uncontrolled visitor movement. This solution, simple yet technically refined, has made possible the direct enjoyment of the archaeological area without altering its original perception or interfering with the legibility of the ancient structures.



Fig. 4 - The access staircase, view from the west (©University of Naples L'Orientale)

Visitor pathways

Once the main access to the site had been secured, the planning of visitor circulation focused on defining internal walkways conceived as interpretive routes within the archaeological landscape. Their design goes beyond the mere logistical function of circulation, assuming the role of a narrative and interpretive “corridor” intended to convey to the visitors the spatial and topographical perception of the site as it may have appeared during its Iron Age occupation.

The system of walkways, structured as a “continuous network,” connects the various sectors of the settlement, towers, residential quarters, storage areas, and the edges of the defensive perimeter, thus enabling a gradual understanding that progresses from the architectural to the territorial scale (Fig. 5). At present, the pathways extend for a total length of about 160 meters, distributed across four main routes: two aligned along the internal axis of the settlement, one tangent to the eastern defensive wall, and another newly designed path leading toward the area designated for the Wādī Banī Khālid *Antiquarium*, located downstream of the site and near a potential visitor parking area.

This latter route serves as the concluding axis of the visitor experience, an itinerary guiding visitor from the ancient residential fabric to the contemporary museum context. The dual function of these walkways ensures, on the one hand, physical and visual continuity between the site and the museum, and on the other, translates into museographical terms the principle of the knowledge circularity, according to which the understanding of archaeological data arises both through direct observation in situ and through

its interpretive display. Along these routes, rest points are marked by interpretive stations, small areas paved with stabilized cobbles and bordered by low stone curbs, designed to host permanent informational panels.⁵

The layout of the pathways is based on two parallel rows of small river cobbles, once again selected for their color and grain size consistent with the surrounding soil. This solution, devoid of anchors or artificial substructures, makes it possible to visually indicate the path without interfering with archaeological stratigraphy. The surface is leveled with a light layer of sand and gravel, sufficient to stabilize walking while remaining permeable to rainwater, thus reducing surface runoff. The average width of the corridors varies between 80 cm and 1.2 m, depending on soil conditions and the need for wider circulation near rest areas.

From a perceptual standpoint, the internal walkways were conceived as a sequence of panoramic viewpoints. The alignment of the paths, often tangent to the wall structures, allows visitors to closely observe the construction details of towers and dwellings, while also perceiving the volumetric relationship between the buildings and the surrounding landscape (Fig. 6). The progression from the central residential sector toward the outer wall leads to natural terraces overlooking the wadi valley, offering a comprehensive view of the entire complex and its strategic position.

Particular attention has been devoted to reversibility and maintenance. The pathways can be removed without leaving permanent traces, while the information panels can be anchored to shallow stone bases. An annual maintenance plan has been established, including leveling checks, sediment removal, and verification of the legibility of the informational supports, in order to maintain consistent perceptual quality and visitor safety.

The functional integration with the *Antiquarium* enhances the value of the visitor experience, establishing WBK1 as a unified center for territorial interpretation: the site and the museum are conceived not as separate entities, but as complementary parts of a single narrative system. The physical connection between the two spaces transforms the visitor experience into a circular journey in which scientific understanding and sensory perception mutually reinforce one another. The *Antiquarium* is envisioned as part of a wider landscape system. Its spatial layout draws on the morphology of the wadi and the stratigraphic logic of excavation, translating the archaeological section into an inhabitable narrative sequence.⁶ The design thus aims to restore a continuity between architecture, terrain, and memory, acting as *trait de union* between history and territory

Looking ahead, the internal pathway network and its connection with the *Antiquarium* will form the foundation for future programs of heritage education and sustainable cultural tourism, integrating WBK1 into the network of visitable sites in the eastern Hajar and strengthening the relationship between archaeological research, the local community, and territorial enhancement.

⁵ The display panels, conceived during a preliminary design phase that prioritizes structural longevity and minimal perceptual interference with the surrounding archaeological landscape, are based on a load-bearing frame made of satin-finished stainless steel, treated with a matte surface finish to reduce light reflection, and on a multilayer fiberglass didactic cladding whose composite profile ensures effective protection against prolonged exposure to climatic variations. Each element will feature bilingual texts (Arabic-English) accompanied by site plans, excavation photographs, and reconstructive drawings.

⁶ “The city is the locus of the collective memory. [...] The relationship between the *locus* and the events that take place within it determines the image of the city.” (Rossi 1982, 30).



Fig. 5 - The building of the visitor pathways, from the wall's perimeter leading toward the inner part of the site (©University of Naples L'Orientale)



Fig. 6 - The building of the visitor pathways following the wall's perimeter (©University of Naples L'Orientale)

A digital valorisation for Wādī Banī Khālid

In line with the Ministry's strategic planning, the creation of a local museum (*Antiquarium*) intended to house and showcase the artefacts unearthed during the WBK excavations is currently under evaluation.

Alongside the material conservation interventions, a digital valorization strategy has been developed, envisioning the development of a dedicated web portal and, in the longer term, the establishment of an integrated digital museum. This museum will include both a virtual reconstruction of the archaeological site and a three-dimensional representation of the future physical museum.⁷

This dual infrastructure, both physical and digital, reflects the strategic vision of the Ministry of Heritage and Tourism, which regards the heritage digitalization as a means of ensuring the continuity of knowledge and promoting collective participation (Al-Raei 2022) by combining digital humanities (Mehta, Hemmy 2021, 56-58), methodological rigor, public engagement, and technological management. In architectural terms, the physical and digital dimensions are conceived as complementary spatial experiences. The built *Antiquarium* defines a material continuity with the stone and sediment of WBK1, while the virtual counterpart extends its perceptual horizon, reconfiguring the notion of place through augmented spatial narratives (Pallasmaa 2012, 44-50).

In the specific case of Wādī Banī Khālid, digitalization transcends the role of a simple educational or dissemination tool, taking on an epistemic function that extends the scope of archaeological research. It links the material dimension of archaeological data to its digital representation, establishing a continuum between observation, modeling, and interpretation. Within this framework, digital valorization becomes an integral part of the cognitive process, as it transforms archaeological data into a shared communicative and analytical language.⁸ This approach, already successfully tested in Oman, has proved particularly effective

⁷ A precedent is represented by the Virtual Museum of Salūt project, which was the first to translate the three-dimensional documentation of an Omani archaeological site into a museum format, experimenting with an interactive model of engagement based on the integration between digital reconstruction and the physical exhibition space (Tagliamonte 2019, 174-176).

⁸ An effective digitalization process cannot exclude the participation of local communities, since the authenticity of heritage does not reside solely in the geometric accuracy of its representation, but in the capacity to reflect the values, memories, and practices embedded within it. Digital documentation of heritage, especially in the contexts of the Arabian Peninsula, cannot be conceived as a mere technical operation of surveying and modeling, but rather as a complex cultural practice that encompasses material,

in educational contexts, fostering active learning (“learning by doing”; See Mortara *et al.* 2014, 319) and encouraging positive engagement with archaeology among school-age students (Ambusaidi, Al-Rabaani 2019, 499-500).

Through digital applications, from 3D surveying to modeling, a form of active preservation is thus established, capable of ensuring the continuity of knowledge even in the absence of direct physical contact with the site. In this perspective, digital documentation of heritage should not be understood as a mere replica of the object, but rather as an ecosystem (Forte 2004, 424) of relationships among data, context, and interpretation (Buragohain *et al.* 2024, 4-5), in which cultural value emerges through the interconnection of multiple informational layers. Such an approach draws on the epistemology of *designing for experience* (Wright, McCarthy 2010), in which the visitor’s embodied interaction becomes the primary medium for learning and interpretation (*ibid.*, 17-24).

The theoretical framework underpinning the site’s digital enhancement site is grounded in the idea that playful mechanisms and interactive participation serve as key drivers for knowledge construction and cultural mediation. Digital engagement is not conceived as a passive consumption of content, but as a situated learning experience in which users are invited to explore, interpret, and connect information through a process of action and response.⁹ In this dynamic, play, understood in its anthropological sense as a tool for the symbolic re-elaboration of reality, becomes the cognitive paradigm through which the virtual environment transforms into a shared space of knowledge. This convergence between play and learning also aligns with current research in *game-based design for cultural heritage*, which explores how immersive environments can extend interpretive depth and foster empathy through spatial storytelling. Here, design operates not as a static display mechanism but as a dynamic medium for speculative reconstruction and critical imagination (Champion 2019, 34-52).

It is precisely within these dynamics that continuity emerges between popular and vernacular arts (of which the *Antiquarium* will host a dedicated section) and digital media. The virtual dimension thus stands out as a “living art form,” capable of evoking emotion, identification, and a sense of belonging, not through contemplation, but through action (Jenkins 2005, 23). Within this same perspective, a video game has been conceived, grounded in interaction¹⁰ and the aesthetic-cognitive response model (MDA),¹¹ capable of

symbolic, and participatory dimensions. As Thompson (2016, 211-226) has pointed out, the process of digital preservation in Gulf sites, particularly in the case of Al Jazeera Al Hamra, must be interpreted as an act of mediation between memory and representation, in which technology does not replace heritage but translates its historical and semantic depth into a new language. From this perspective, digitalization is not limited to reproducing the visible image of an object; it becomes a tool of cultural continuity, capable of preserving not only the architectural form but also the social memory and lived experiences that gave rise to it.

⁹ Digital engagement is not conceived as the passive consumption of content, but as a situated learning experience in which the user is invited to explore, interpret, and connect information through a process of action and response, within a regulated environment that suspends ordinary reality to create new forms of meaning. For the concept of play as a cultural act and generator of meaning, see *Homo Ludens* by Huizinga (1949).

¹⁰ Interaction, in fact, is the essential condition of its effectiveness: the player acts, experiments, and transforms, becoming an integral part of the aesthetic and cognitive process. The contemporary game designer, as observed by Crawford (Crawford 1984, preface XI-XIV), is an artist capable of anticipating and orchestrating the user’s reactions, shaping a narrative system that generates surprise, tension, and emotional engagement.

¹¹ The structural formalization of these processes can be interpreted through the Mechanics-Dynamics-Aesthetics (MDA) model, formulated by Hunicke, LeBlanc, and Zubek (2004) and later reinterpreted within participatory and museological frameworks (Junior, Silva 2021; Bunt *et al.* 2024). This model provides a valuable conceptual framework for understanding how digital engagement can be conceived as an act of cognitive interaction rather than as mere visual consumption or entertainment activity. The model describes games, and, by extension, any interactive system, as a process articulated across three complementary levels: *mechanics*, that is, the rules and structures that define possible actions; *dynamics*, the ways in which those rules generate emergent behaviors and responses; and *aesthetics*, the emotional, perceptual, and intellectual experience produced in the player. From this

translating archaeological complexity into a narrative system where discovery and learning unfold through experimentation, hypothesis, and verification. The visitor, assuming an active role in the process, does not merely observe the reconstruction but inhabits and questions it, personally reconstructing the meaning of the data and material traces. The ludic dimension, in this sense, does not diminish the scientific value of representation but rather expands its communicative potential, making archaeological knowledge accessible, experiential, and reflective. This approach, chosen for WBK, aligns with the most recent museological reflections (Hooper-Greenhill 2007, 25-26) that conceive the museum, whether physical or virtual, as a place of active learning. The contemporary visitor is no longer a passive recipient of content¹² but an active co-author of interpretive experience. In this view, the virtual museum does not merely reproduce the archaeological site but translates its cognitive structure: exploration replaces guided tours, discovery takes the place of explanation, and learning arises from direct engagement with data and its complexity.¹³

The digital valorization of Wādī Banī Khālid thus presents itself as a model of immersive and reflective education, in which technology enhances the cognitive relationship between individuals and heritage. The virtual museum becomes an epistemological laboratory where material culture, perception, and memory interact in real time, transforming the act of visiting into a critical practice of learning. The adoption of these principles goes beyond the educational sphere and reflects a broader museological conception of the museum as a communicative space: digital museography redesigns the conditions of spatial experience, transforming navigation into a process of knowledge construction. At the same time, digital valorization fully integrates into the paradigm of the digital humanities applied to archaeology, in which technology assumes an analytical and reflexive role. WBK1 thus stands as an exemplary case of transdisciplinary research, where archaeology opens itself to new languages of investigation and communication. The project aims to demonstrate how digital design methodologies as parametric modeling, real-time rendering, and spatial interface prototyping, can serve as epistemic instruments in archaeological research.

It should be emphasized that the digital strategy adopted at Wādī Banī Khālid responds to a clear political and cultural vision of heritage as a shared good, consistent with the directives of *Oman Vision 2040*, which identifies digital culture as a central pillar of national sustainability. The creation of an integrated system of valorization, both physical and virtual, local and global, represents a step toward defining a replicable model for the management of Omani archaeological sites, capable of uniting scientific research, conservation, and social participation. In this sense, digital valorization does not mark the conclusion of the WBK1 project, but its natural continuation within the immaterial domain of knowledge.

perspective, the virtual museum is not conceived as a closed space but as a modular learning environment in which knowledge is constructed through the interaction of rules, freedom, and narrative. The user, moving within a system of defined but non-prescriptive possibilities, exercises a form of cognitive autonomy that symbolically reproduces the inferential logic of archaeological research: observing, hypothesizing, and verifying.

¹² According to Eilean Hooper-Greenhill (2007), the contemporary museum no longer communicates in a unidirectional way but operates through interpretive processes in which the audience actively constructs the meaning of the experience. The visitor, therefore, does not receive a predefined message but participates in the negotiation of meaning within the exhibition and its contents.

¹³ Antinucci (2014, 82) defines the museum as “a system of cognitive communication,” in which knowledge is constructed through perception and interaction. As he observes, cultural transmission in the contemporary museum can no longer rely on the static display of objects but must activate a network of signs and relationships that enables the audience to reconstruct the meaning of an artefact or context autonomously.

The Digital Museum as Gaming Platform

The design of the virtual museum of Wādī Banī Khālid represents the operational synthesis of the documentation, modeling, and communication processes that have accompanied the archaeological field research activities. The primary objective was not merely the production of a visual artifact, but the creation of an interactive knowledge system grounded in the empirical verification of data and the controlled reproduction of the landscape and architectural context. The workflow was structured in a sequence of integrated phases. First, the previously mentioned photogrammetric and topographic surveys conducted on the site enabled the creation of digital terrain models (DTM), which provided the metric and morphological foundation of the project. These models, processed and optimized in *World Machine*, underwent a geomorphological simulation process that faithfully reproduced the natural landforms of the area, the alluvial slopes and depositional zones, yielding a scientifically coherent and highly realistic representation of the archaeological landscape. The terrain and morphological data were processed through a hybrid GIS–3D workflow. The digital terrain model (DTM) was imported into Unreal Engine to reconstruct the topography in 3D, where material shaders were applied to enhance visual realism and maintain consistency with the morphological data.

For many of the architectural features, modeling was carried out in *Blender* (Corrado 2020, 132), an open-source software selected for its ability to handle large amounts of geometric data and its compatibility with major 3D interchange formats. All structures, walls, towers, domestic units, and service areas, were reconstructed to scale; during this phase, digital models of selected artifacts were also integrated, derived from photogrammetric surveys of diagnostic materials and reprocessed as optimized meshes for interactive visualization. The digital modeling phase was approached emphasizing the material legibility of surfaces and volumes. Polygonal density, texture fidelity, and light response were calibrated to reproduce the sensorial experience of mass, lightness, and depth typical of the site’s lithic architecture.

The texturing process combined original photogrammetric materials with digital resources chromatically to correspond to actual surface tones. This stage, essential for both perceptual rendering and model legibility, was conceived as a *data fusion* operation, in which high-resolution textures were mapped with physical properties closely corresponding to the actual archaeological materials. The use of open-source resources and the adoption of interoperable standards respond to the need to ensure transparency, replicability, and long-term preservation of digital data, core principles of research within the digital humanities.

The subsequent phase of rendering and immersive simulation was carried out in *Unreal Engine 5*, selected for its ability to handle high-polygon environments in real time. The *Nanite* technology enabled the visualization of models with high geometric density without the need for mesh reduction or baking, thus preserving the full detail of structural elements. The integration of Nanite virtualized geometry allowed polygon counts to be processed without compromising frame rate performance, maintaining the full-resolution geometry.

Nevertheless, the increase in the number of three-dimensional assets posed performance optimization challenges, since each landscape element (stones, fragments, debris) was assigned specific physical and collision properties. To mitigate the computational load, a multilayer *Level of Detail* (LOD) system and *occlusion culling* strategies were implemented, dynamically managing visibility based on the observer’s distance.

Global illumination was handled through the *Lumen* system, which allows for the simulation of indirect light propagation and ensures photometric accuracy consistent with real environmental conditions. The atmospheric context was further refined through the calibration of dynamic parameters, such as

variations in brightness, air density, and dust particle distribution, adjusted to values closely matching real-world conditions. This approach aimed to reproduce the perceptual quality of the landscape, balancing realistic fidelity with immersive plausibility.

Within this framework, the interactive component was designed to encourage active visitor participation. A controllable avatar (Fig. 7) was developed, equipped with third-person navigation controls and the option to switch to first-person view during exploration phases. The walking system follows the actual topography of the site and integrates the dynamic resistance of the terrain, simulating friction and slope gradients. The interactive system was designed with a performative logic, parameters such as acceleration, gravity, and terrain feedback were fine-tuned to induce a bodily awareness of spatial resistance. These design choices do not pursue playability in a strict sense but rather aim to generate a cognitive experience grounded in the bodily perception of the archaeological space.



Fig. 7 - The avatar inside WBK1 is looking at the Digital Museum (©University of Naples L'Orientale)

A second level of the digital environment hosts the virtual museum (Fig. 8), conceived as an interpretive extension of the site. Within it, visitors can interact with 3D models of the artefacts, rotating, zooming, and examining them in detail, while accessing their technical descriptions, excavation photographs, and related site plans. A *virtual photography* mode has been implemented, allowing visitors to document their exploration and create personal archives. Free from the physical constraints of space and conservation, the museum can potentially host an unlimited number of objects, functioning as an expandable, multilayered archive. The notion of the museum as a dynamic database extends the concept of spatial design beyond its material boundaries. Here, data curation and interface design become architectural operations that shape the visitor's spatial and cognitive experience. The architecture of information thus mirrors the architecture of the site, maintaining a formal and conceptual continuity between the physical and digital realms. The structuring of the database follows the same logic as the architectural project: modular, hierarchical, and relational. In both cases, the design process constructs systems of spatial meaning, whether material or informational, capable of being navigated, expanded, and interpreted. The architecture of information thus operates as an invisible infrastructure of place-making, bridging computational logic and architectural form.

The platform has been optimized for execution on Windows systems to ensure maximum compatibility and accessibility with standard IT infrastructures. At the same time, a prototype *augmented reality* (AR) module is under development, designed to project portions of the virtual museum into the physical context, thereby integrating remote experience with on-site presence. This extension, in line with the most recent developments in *augmented, virtual, and mixed reality* (Bekele *et al.* 2018, 1-30), aims to establish a model of hybrid engagement in which digital interaction does not replace the real experience but enhances it and extends its persistence over time.



Fig. 8 - A scene inside the Digital Museum in standpoint visual navigation (©University of Naples L'Orientale)

From a methodological standpoint, the creation of the Wādī Banī Khālid virtual museum demonstrates that the technological workflow is an integral component of the scientific construction of heritage. Modeling, simulation, and interactivity become stages of a unified process of mediation, where metric accuracy converges with perceptual understanding and knowledge transmission. In this perspective, the virtual museum constitutes a continuously evolving research environment, open to future updates and reinterpretations

Acknowledgment

We would like to express our thanks to the Italian Ministry of Foreign Affairs and International Cooperation and the Centro Interdipartimentale di Servizi di Archeologia (CISA-UNIOR) for supporting the project as well as to all the Colleagues of the Ministry of Heritage and Tourism. We are particularly grateful to the people of Wādī Banī Khālid and to our friend Mohammad al-Nadhiri.

REFERENCES

Albro, S.R., S. Bertalan, A. Dwan, H. Krueger, E.C. Leslie, K. Nicholson, K. Schenck, A. Seibert, D. van der Reyden, T.B. Wallis (1989) Adhesives, in C.I. Maynor (ed.), *Paper Conservation Catalog, 6th edn.* (American Institute for Conservation) Washington D.C.

- Al-Raei, A.A. (2022) *Displaying the Nation: The Role of Museums in the Expression of National Identity in the Sultanate of Oman*. [Phd. Thesis, University of Birmingham].
- Ambusaidi, N.A., A.H. Al-Rabaani (2019) The Efficiency of Virtual Museum in Development of Grade Eight Students' Achievements and Attitudes towards Archaeology in Oman, *International Journal of Educational Research Review* 4, pp. 496-503.
- Antinucci, F. (2014) *Comunicare nel museo*. Roma.
- Bekele, M.K., R. Pierdicca, E. Frontoni, E.S. Malinverni, J. Gain (2018) A Survey of Augmented, Virtual, and Mixed Reality for Cultural Heritage, *Journal on Computing and Cultural Heritage* 11/2, pp. 1-36.
- Bunt, L., J. Greeff, E. Taylor (2024) Enhancing Serious Game Design: Expert-Reviewed, Stakeholder-Centered Framework for Serious Games, *JMIR Serious Games* 12, pp. 1-22.
- Buragohain, D., Y. Meng, C. Deng., Q. Li, S. Chaudhary (2024) Digitalizing cultural heritage through metaverse applications: challenges, opportunities, and strategies, *Heritage Science* 12, pp. 1-16.
- Champion, E. (2019) *Critical Gaming: Interactive History and Virtual Heritage*. London.
- Corrado, L.A. (2020) Il vasellame in pietra dagli scavi italiani de "L'Orientale" di Napoli a Bimah, Sultanato dell'Oman, *Newsletter di Archeologia CISA* 11, pp. 125-146.
- Crawford, C. (1984) *The art of computer game design: reflections of a master game designer*. Berkeley, California, USA.
- Feilden, B.M., J. Jokilehto (1987) *Management Guidelines for World Cultural Heritage Sites* (ICCROM). Roma.
- Forte, M. (2004) Dal reale al virtuale verso una comunicazione arricchita?, *Archeologia e Calcolatori* 15, pp. 423-448.
- Hooper-Greenhill, E. (2007) *Museums and Education: Purpose, Pedagogy, Performance*. London.
- Huizinga, J. (1949) *Homo Ludens. A Study of the Play-Element in Culture*. London.
- Hunicke, R., M. LeBlanc, R. Zubek (2004) MDA: A Formal Approach to Game Design and Game Research, *Proceedings of the AAAI Workshop, Challenges in Game AI* 4, pp. 1-5.
- Jenkins, H. (2005) Games, the New Lively Art, in J. Hartley (ed.), *Creative Industries*, pp. 175-189. London.
- Junior, R., G.M. Silva (2021) Redefining the MDA Framework. The Pursuit of a Game Ontology, *Information* 12, pp. 1-19.
- Kroll, S. (2013) The Early Iron Age Fort at Lizq. Sultanate of Oman, *Zeitschrift für Archäologie Außereuropäischer Kulturen* 5, pp. 159-220.
- Loreto, R. (2017) Note on the Fourth Season of the Italian Restoration Project in Kingdom Saudi Arabia, Dūmat al-Jandal, *Newsletter di Archeologia CISA* 8, pp. 123-133.
- Loreto, R. (2020) A Late Iron Age settlement in Wādī Banī Hālid: First season of the joint Omani-Italian archaeological project, *Arabian Archaeology and Epigraphy* 31, pp. 365-392.
- Loreto, R. (in press) *Ichthyophagoi: their culture and economy. 10 years of archaeological activities along the River Ocean shores within the northern Oman Iron Age*, *Proceedings of the Conference Egitto e Vicino Oriente Antichi*, Turin, Eothen.
- Loreto, R., B. Marcolongo (2023) *Manuale di geoarcheologia. Un approccio geomorfologico da remoto*. Napoli.
- Masschelein-Kleiner, L. (1995) *Ancient Binding Media, Varnishes and Adhesives* (ICCROM) Roma.
- Mehta, R.A., K. Hemmy (2021) Digital Humanities in Oman: Logistics, Challenges and Opportunities, *Knowledge Cultures* 9, pp. 56-74.
- Mortara, M., C.E. Catalano, F. Bellotti, G. Fiucci, M. Houry-Panchetti (2014) Learning cultural heritage by serious games, *Journal of Cultural Heritage, Elsevier* 15, pp. 318-325.

Pallasmaa, J. (2012) *The Eyes of the Skin: Architecture and the Senses*. Chichester.

Rossi, A. (1982) *The Architecture of the City*. Cambridge.

Tagliamonte, E. (2019) Il Museo Virtuale di Salut. Alla Scoperta del Cuore dell'Oman, in D. Frenez, M. Cattani (eds), *Dreamers, 40 Anni di Ricerche Archeologiche Italiane in Oman* (BraDypUS Communicating Cultural Heritage), pp. 174-176. Roma.

Thompson, S. (2016) Digitally Preserving the Heritage of the Arabian Peninsula: Al Jazeera Al Hamra Considered, in G. Katodrytis, S. Syed (eds), *Gulf Cities as Interfaces* (Gulf Research Centre Cambridge), pp. 211-228. Cambridge UK.

Torraca, G. (2005) *Porous Building materials. Materials Science for Architectural Conservation* (ICCROM). Roma.

Yule, P. (1999) The Samad period in the Sultanate of Oman, *Iraq* 61, pp. 121-146.

Yule, P. (2016) Valorising the Samad Late Iron Age, *Arabian Archaeology and Epigraphy* 27, pp. 31-71.

Wright, P., J. McCarthy (2010) *Experience-Centered Design: Designers, Users, and Communities in Dialogue*. San Rafael.



Digital Tools for Heritage Protection and Conservation in Conflict-Prone Areas: A Glympse from Northeastern Africa and the Horn

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Abstract

Northeastern Africa and the Horn are universally recognized as a melting pot of cultures and civilizations with a rich and diverse archaeological heritage paralleled by sumptuous packages of languages, traditions and systems of knowledge. Unfortunately, the area is also prone to recurrent political crises and social tensions that often escalate into long periods of armed conflicts. The impact on tangible heritage is always extremely severe. Sites, museums and cultural centres are intentionally or accidentally targeted by drone attacks, looted or severely damaged by lack of infrastructure and land maintenance. Objects are destroyed, dispersed or entered into the illegal trafficking circuit. Intangible heritage is also heavily compromised. The loss of lives and the migration of people contributes to the disappearance of systems of knowledge impossible to recover and pass on. In such areas, issues related to protection strategies for cultural heritage should become a crucial component in the agenda of archaeological research programs. Based on our experience in Egypt, Ethiopia and Sudan, this paper will discuss a set of digital tools useful to adopt when working in conflict areas. Special attention will be given to the role that virtual museums can play in such regions.

Keywords: Heritage conservation, Digital technologies, Virtual museums, Conflict areas, Horn of Africa, Northeastern Africa

Citation: Manzo, A. et al., Digital Tools for Heritage Protection and Conservation in Conflict-Prone Areas: A Glympse from Northeastern Africa and the Horn, *Archeologie tra Oriente e Occidente*, vol. 3-4, pp. 61-97, <https://doi.org/10.6093/archeologie/13094>

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Introduction

Political crises and military conflicts, together with climatic change, are certainly the factors that have the greatest impact on cultural heritage in our time. Coupled to the old “traditional” ones, such as anthropisation and urban development, they make the issue of cultural heritage management, both tangible and intangible, increasingly challenging. This is certainly true all over the world, but it is obviously more evident in conflict-prone areas, and North East Africa is certainly one of them. Given these challenges, prioritizing conflict protection strategies for cultural heritage in this region is essential.

This paper proposes potential strategies and digital tools of heritage documentation, protection and promotion rooted in our experience in Egypt, Sudan and Ethiopia. Such measures could form the core of a progressively richer robust protocol to safeguard cultural assets and ensure access to information in conflict scenarios.

The macro-region we are dealing with, Northeastern Africa and the Horn, is universally recognized as a melting pot of cultures and civilizations. It includes countries whose tangible and intangible heritage is extremely rich, such as Egypt, Sudan, Eritrea and Ethiopia, that have witnessed profound events in human

¹ Luisa Sernicola authored the part of the article dealing with the mapping and use of GIS, Andrea Manzo the section on the use of remote sensing and on the monitoring of the sale of antiques on the web, Domenico Filosa the section on the virtual museums. Andrea Manzo and Luisa Sernicola are also responsible for the final remarks.

history, from evolutionary processes to migrations, interactions, ecological adaptations, and societal developments. This historical wealth has gifted us with a diverse archaeological heritage, further enriched by a multitude of languages, traditions, and systems of knowledge.

In this region, the University of Naples L'Orientale (henceforth UNIOR) and the International Association for Mediterranean and Oriental Studies (henceforth ISMEO) have a long-established tradition of archaeological research activities.

In this paper we will focus on three UNIOR-ISMEO archaeological projects: the one at Mersa/Wadi Gawasis, on the Egyptian coast of the Red Sea, and its hinterland in the Eastern Desert of Egypt, the one in the Eritrean-Sudanese lowlands, and the one operating in the area of Aksum, in northern Ethiopia (Fig. 1).²

Within the framework of joint agreements and programmes with local stakeholders (universities, state agencies at central and regional level, and local communities), all the projects, in addition to research activities, also promote actions geared towards heritage protection and management, community archaeology and capacity building.

Unfortunately, over the past decade, all these areas witnessed the escalation of acute and chronic political and military crises, which are still ongoing in some cases. These tragic circumstances have always also severely endangered the tangible and intangible heritage.

In Egypt, the outbreak of an internal political crisis occurred in 2011 and 2013. As far as tangible cultural heritage is concerned, it led to sporadic direct attacks on cultural sites (e.g. the damage to the



Fig. 1 - Map showing UNIOR-ISMEO research areas discussed in the text

² The project in the area of Aksum has been launched in 1993. From 1993 to 2003 it was carried out in collaboration with Boston University (henceforth BU) and co-directed by Rodolfo Fattovich and Kathryn A. Bard. From 2004 to 2013 it was directed by Rodolfo Fattovich and since 2014 it is co-directed by Andrea Manzo and Luisa Sernicola. Overviews of the results of the project are reported in a series of articles authored by the members of the expedition (Bard e Manzo 2025, Fattovich *et al.* 2000, 102 and Sernicola 2021). Comprehensive reports of each field season from 2010 to 2019 are published in *Newsletter di Archeologia*, an online, open access journal edited by the Centro Interdipartimentale di Servizi di Archeologia of the University of Naples L'Orientale. <https://www.unior.it/it/centri-di-servizio/cisa-centro-interdipartimentale-di-servizi-di-archeologia/newsletter-archeologia>).

The project in the Eritrean-Sudanese lowlands was inaugurated by Rodolfo Fattovich in 1980 in the framework of a collaboration with the Butana Archaeological project by the Southern Methodist University and University of Khartoum directed by Anthony E. Marks and Abbas Mohammed Ali. Fieldwork was suspended in 1995 and resumed in 2010 under the direction of Andrea Manzo. For a detailed discussion of the results of the investigations see Manzo 2017, 100. Like in the case of the expedition to Ethiopia, since the 2010 field season, reports of the activities regularly appeared in the online open access journal *CISA Newsletter di Archeologia*. The project at Mersa/Wadi Gawasis, in collaboration with BU and the ISMEO, was inaugurated by Rodolfo Fattovich and Kathryn A. Bard in 2001. Fieldwork was suspended in 2011 and resumed in 2022 with the name of SAWW project, under the direction of Andrea Manzo, Mahmoud Emam and Chiara Zazzaro. For a discussion of the results of the first ten years of investigations see Bard, Fattovich 2007, 368 and Bard *et al.* 2022, 752.

Egyptian Museum in Tahrir Square) but, more importantly, they resulted in decreased control over monuments and archaeological sites with a consequent increase in illicit excavation activities.

In Sudan, in spite of the endemic political crisis and instability that has characterised the country since 2019 and the long-lasting armed conflicts in the western and southern regions, tangible heritage was not significantly affected until the outbreak of armed conflicts in April 2023 in the capital Khartoum. The National Museum is located in the centre of the city, which has since been turned into a battlefield, and the museum was immediately seized by armed groups. Moreover, as also happened during military crises in the western and southern regions of the country for many years, the consequences of the ongoing widespread conflict on the intangible heritage are incalculable, due to the forced displacement of entire communities and human loss.

In the case of Ethiopia, after the end of the civil war in 1991, a war broke out in 1998 with Eritrea which only lasted in 2019, with a direct impact on the tangible heritage mainly on the Eritrean territory, and an internal conflict affected the northern part of the country, and in particular areas of the Tigray, Amhara and Afar regions, from November 2020 to November 2022. In this last occasion, there have been extensive damages. Archaeological sites, museums, and cultural centres have been targeted, looted, or left to deteriorate. The illegal trade of artifacts, including ancient manuscripts and liturgical items, has been rampant. The intangible heritage, embodied in traditions, knowledge, and societal bonds, is also at risk.

In the following sections, we will explore how the use of digital tools can help mitigate and monitor the effects of conflicts on heritage. Special attention will be given to virtual museums, whose contribution to heritage preservation and promotion in such regions is highly significant.

Mapping

Digital archaeological maps are nowadays a fundamental and widespread tool in historical and archaeological heritage study and management projects as they, on one side, facilitate the study of relevant historical phenomena, on the other hand, enable the assessment of archaeological areas and of the state of preservation of the evidence, the creation of high-resolution maps to support urban planning strategies that protect the heritage, the elaboration of predictive models to produce maps of potential location of new archaeological sites, and the identification of areas suitable for scientific research and tourism development. Equally important, a further significant application of digital archaeological maps would be its use in post-war reassessments of the archaeological heritage, as it proved to be for the area of Aksum, in northern Ethiopia.

Located in the core region of the Tigrean plateau, the city of Aksum is universally recognized as a prominent religious and historical centre, a significant symbol of Ethiopian cultural identity and one of the most important archaeological sites of the country, included since 1980 in the UNESCO World Heritage List.

Due to its historical relevance, Aksum has been undoubtedly one of the most thoroughly archaeologically investigated sites of the northern Horn of Africa. Intensive research in the area not only has increased knowledge on the dynamics that underwent ancient Aksum's emergence and subsequent development, but also has allowed the assessment of its archaeological heritage with the creation of a progressively richer literary corpus of data from occasional descriptions of monuments by 15th-to 19th century European travellers and explorers to scientific reports of 20th and 21st century excavation and survey projects.

The combination of these resources within a GIS-based geodatabase led to the creation of the Archaeological Map of Aksum which undisputably resulted to be a key tool for the study, management and protection of the archaeological heritage of the area also in the aftermath of the recent conflict.

Generated by the systematic scrutiny of bibliographic resources and by the comprehensive survey of the whole territory of Aksum,³ the map includes an overall amount of 698 sites. It covers a total area of ca. 105 sq km that includes flat lands, steep slopes and terraced hillsides as well as intensively settled spots including the present urban area (Figs. 2, 3). Topographic maps⁴ and satellite images⁵ were used to navigate the area both remotely and near ground.

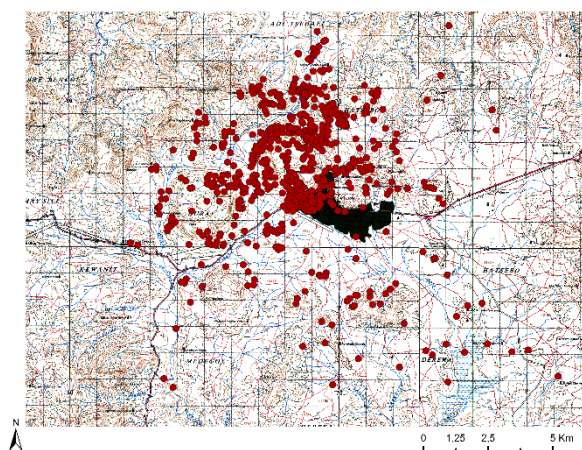


Fig. 2 - The archaeological map of Aksum (1:50.000)

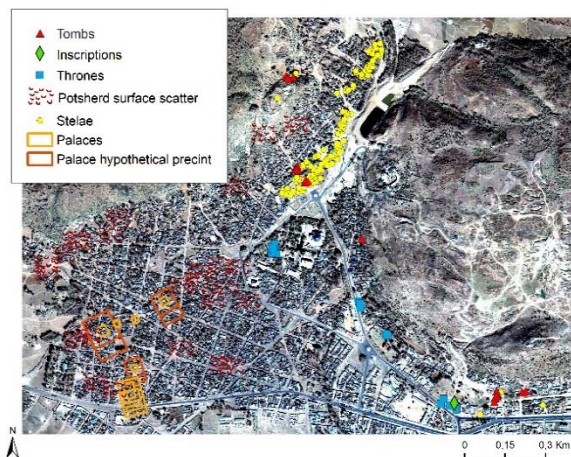


Fig. 3 - The archaeological map of Aksum-City Centre (base: Ikonos satellite image)

All the sites in the database are accompanied by information about their location, environmental characteristics, type and extension of evidence, present land-use, state of preservation and the natural and/or anthropic disturbance factors, and are classified on the basis of their chronology and function.

Quantitative and spatial analysis performed using a GIS software allowed to classify the archaeological area of Aksum into three major zones based on the density of the archaeological evidence as well as to analyse distribution of the sites with respect to the topography of the area and present land-use (Sernicola 2017, 150). This led to the creation of a map of the archaeological risk where the susceptibility to the main causes of alteration, degradation and obliteration of the archaeological heritage is displayed (Fig. 4). Post-depositional taphonomic processes due to agriculture, grazing, and reforestation were considered in this phase (Schofield 1991, 151). A map of slopes degree has been also generated to evaluate the areas where the preservation of archaeological deposits may be most disturbed by erosion (Fig. 5).

One of the main consequences of the three years of conflict in Tigray on Aksum's archaeological heritage has certainly been the lack of maintenance of the slopes. This has initiated

³ The survey was carried out between 2000 and 2006 as part of two different programs: the Landscape Archaeology Project conducted by the joint UNIOR-BU archaeological expedition at Aksum, and the Ethiopian Cultural Heritage Project – Aksum branch – Site Planning and Conservation Component sponsored by the World Bank (WB). The WB survey project at Aksum was co-directed by Rodolfo Fattovich and Takla Hagos, and carried out with the contribution of Luisa Sernicola and Laurel Phillipson (2012, 2013a, 2013b). Technical reports of the survey campaigns have been prepared by Fattovich and Takla Hagos. For a discussion of the results see Fattovich, Takla Hagos 2005, 26 and Fattovich, Takla Hagos 2006, 327.

⁴ Ethiopian Mapping Agency, 1992, 1:2000, sheets 2, 4, 5; Ethiopian Mapping Agency, 1997, 1:50.000, Series Eth4, sheets 1438 D3 (Axum) and 1438 D4 (Adwa).

⁵ IKONOS (1 m res.), ASTER (15 m res.), Earthsat (30 m res.).

intense erosion phenomena that severely affected the archaeological sites located along the slopes or at the base of the hills. Most of these sites are only surface-observed and have never been excavated so far. The map of slopes degree will help targeting erosion-prone areas and sites to be checked by direct field observation and/or through remote sensing. Indeed, a further use of the GIS-based Archaeological Map of Aksum could be in the periodic monitoring of sites preservation through satellite images. This proved to be extremely fruitful in present Sudanese conflictual regions and in inaccessible areas of the Egyptian Eastern Desert, as we will see in the following section.

The GIS-based Archaeological Map of Aksum will also be used as a basemap in the Feasibility Study for the “Improvement of Axum Archaeological Site and Related Services” project recently initiated by the Agenzia Italiana per la Cooperazione allo Sviluppo.⁶

Monitoring

One of the most immediate consequences of political and military crises is the weakening of territorial control. It can lead to an increase in illegal excavations which is directly related to the illicit trade in antiquities. This has always been practised in countries such as Egypt, where there is awareness of the economic value of ancient objects, while it is more recent in the regions South of it, especially in Ethiopia. However, even there, the illegal trade in antiquities had already begun before the latest political and military crises, as evidenced by the laws enacted against it in both Sudan and Ethiopia. This illegal practice intensifies in times of economic difficulties that are very often linked, as a cause or effect, to political and military crises.

In the Eastern Desert of Egypt, a Roman Station in the lower Wadi Gasus was in good condition when it was surveyed in 2000 by the Italian-American team working at Mersa/Wadi Gawasis. Around 2010 it was hit by the first illegal excavations in search of antiquities and possibly gold, but the damage became more and more extensive from 2011 to 2013, during and immediately after the political crises (Fig. 6), when the site was investigated by the Italian Archaeological Mission in the Eastern Desert.⁷ Illegal excavations continue to this day, encouraged by the never-ending economic crisis that drives people to look for additional sources of income. This is also evident at the ancient gold mining site of Wadi Rahaia, where damages took place after 2015, i.e. well after the end of the phases of political instability, when the site was

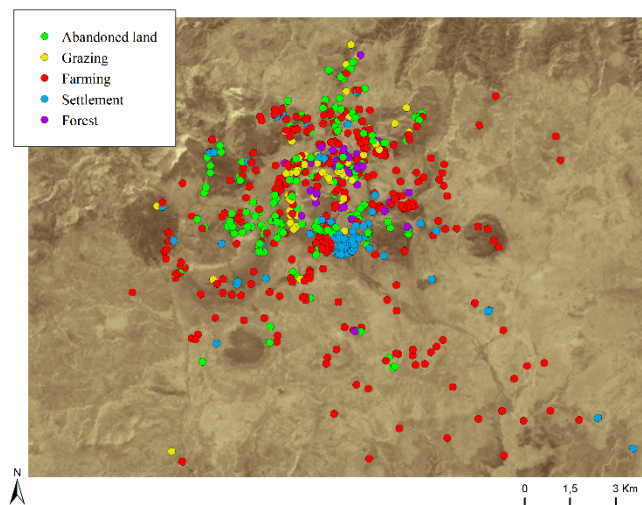


Fig. 4 - Archaeological sites in the Aksum area classified on the basis of disturbance

⁶ This ongoing project is coordinated by 58th People&Projects and involves University of Naples Orientale and ISMEO.

⁷ The Italian Archaeological Mission in the Eastern Desert of Egypt was a joint project including Italian and Egyptian institutions (University of Naples L’Orientale, University of Cairo - Faculty of Geology, and University of Helwan - Faculty of Archaeology), directed by Irene Bragantini funded by the University of Naples L’Orientale and the Italian Ministry of Foreign Affairs and International Cooperation. In 2022, the project was merged with the SAWW project, also investigating the site of Mersa/Wadi Gawasis. For a description of the Roman Station and a presentation of the first results of the project see Bragantini *et al.* 2018.

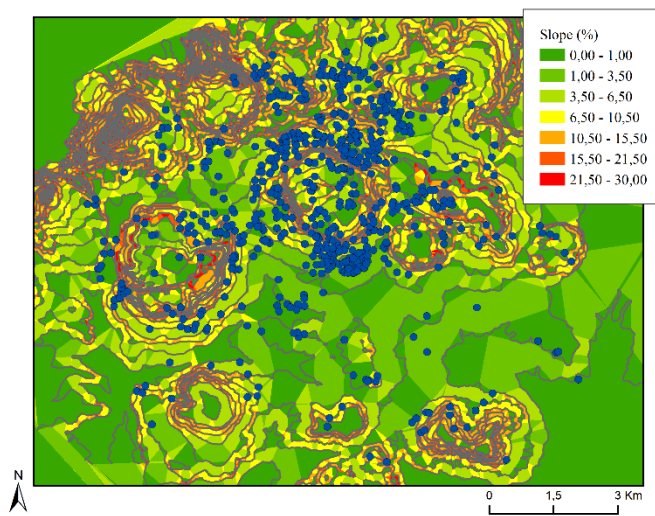


Fig. 5 - Map of slopes degree and sites distribution in the area of Aksum

visited for the first time by the Italian Mission (Bragantini *et al.* 2018). As archaeological expeditions are often involved by local authorities in the management of cultural heritage, in Egypt and Sudan we were regularly asked to inspect sites threatened or damaged by illegal excavations together with local representatives. Some of these sites were also visited year after year, to check whether illegal activities had ceased after reports were made to the police and local authorities. Obviously, on-site inspections of sites cannot be carried out during conflicts or political crises, although it is precisely at these times that they are most needed. In this case, the systematic use of satellite images may be a viable alternative, at least to record when the destruction of sites occurred and to report this to local authorities

in order to plan measures to protect the intact parts of the sites (Fig. 6). This system has also recently been adopted by the Egyptian Ministry of Tourism and Antiquities to monitor sites in hard-to-reach areas.⁸

Closely related to the remote sensing of archaeological sites to counter illegal activities in conflict areas is the tracking of the sale of antiquities on the web. There are in fact several websites where you can buy antiques. These are also monitored by law enforcement agencies, but it can sometimes be difficult for them to investigate the authenticity and identify the possible origin of the antiquities offered for sale. For archaeologists specialised in certain areas or periods, it is easier to identify their provenance and to understand whether they may have come from areas where a political or military crisis is ongoing. Again, when a suspicious object is offered for sale, it is reported to the authorities.

Digitising

In North East Africa and the Horn, a specific factor limiting the possibility to tackle the risk of illicit trade in antiquities both in ordinary times and in times of political or military crisis is the lack of digital records of artefact collections. Indeed, the implementation of digital records should be considered a very effective action to limit theft and illicit trade in antiquities. Moreover, in times of crisis, museums and research institutes are often looted, damaged or destroyed, endangering not only the objects but also the analogue archives and the different types of preserved documentation. Here again, the systematic and extensive digitisation of documents should be considered an effective tool to mitigate the effect of the loss of historical objects and documents during periods of conflict.

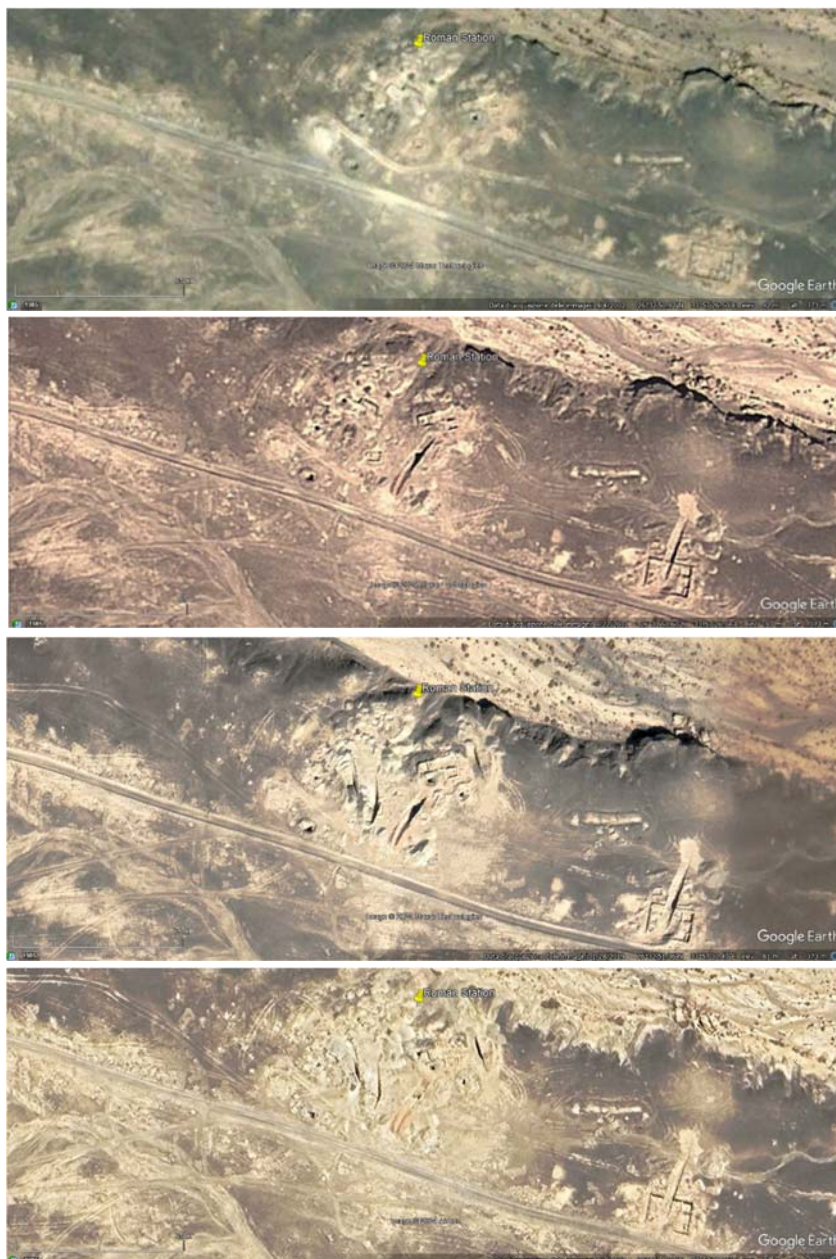
In a similar vein, as intangible heritage is also endangered in political and military crises, meticulous documentation of traditional knowledge should also be considered a priority by research programs. Indeed, mass forced migration and the dispersion of entire communities, if not the loss of life, especially among the most vulnerable, further exacerbates the erosion of traditions and knowledge. Digital technology provides

⁸ For this reason, in the 2023 field season at Mersa/Wadi Gawasis we were asked to give a short introductory course on this system for staff members of the Directorate of Antiquities in Safaga.

tools for the rapid documentation of all aspects of intangible heritage and the secure preservation of documents.

Exhibiting

Museums and cultural centres can play a crucial role in conflict-prone regions. By highlighting common cultural traits and historical interactions, these institutions can foster mutual understanding and a shared identity. This strategy can catalyse the path to lasting peace, which remains the most effective way to preserve our common history. For this reason, it is important that these institutions are kept working even in the times of crisis: virtual museums are the ideal solution in this case.



Wadi Gasus. Years 2002, 2011, 2019, 2023 (top to bottom). Based on Google Earth

It should be emphasised that, besides playing an important role in the areas directly affected by the conflict, the positive impact of virtual museums is on a global scale and in the long term. First of all, they can help raise awareness of the cultural richness of conflict areas in the rest of the world, thereby creating a more inclusive and suitable environment for refugees from those regions.

Furthermore, when the crisis is over, the digital contents generated for the implementation of virtual museums will also be useful to enhance the experience of visitors to the real museum and continue to spread knowledge of the cultural wealth of these regions via the web, which will also have a positive impact on their economy.

The culmination of a digital protocol aimed at the safeguarding and fruition of both tangible and intangible cultural heritage must inevitably lead to the creation of a virtual museum. The drafting of a shared thesaurus, along with the construction of a digital database capable of cataloguing various types of testimonies - preserving not only digital images (photos, videos, 3D models, etc.) but also related information - represents only the foundations of a more ambitious project. The ultimate goal must be to promote accessibility and usability of such resources to the widest and most diverse audience possible. In this perspective, archiving reliable information through data digitization is not only an essential step in the protocol but also the basis for disseminating accurate information. This function - which in itself represents an act of safeguarding cultural heritage—is a fundamental element of the very nature of a museum.

In addition to preserving important testimonies from the past, museums play a crucial role in educating the public by providing reliable and accessible information, thereby allowing for a more accurate understanding of historical and cultural events. These principles, which form the foundation of the definition of “museum” provided by ICOM (International Council of Museums), represent only a portion of the potential of a virtual museum. If designed appropriately, a virtual museum has the potential to overturn the traditional paradigms of the physical museum while maintaining its primary functions, such as the preservation of information related to the historical, artistic, and anthropological evidence of a given region or culture. Its digital nature makes it a crucial tool for the protection and enjoyment of heritage, as it allows for adaptation to a variety of needs and objectives. This makes it particularly versatile and indispensable in promoting fundamental concepts such as safeguarding, social cohesion, education, accessibility, and the enhancement of cultural heritage. Additionally, a virtual museum, with its multiple functions, offers the opportunity to optimally preserve and enhance the intangible cultural heritage of a region, which is often inadequately represented in material culture. This enables the protection of a rich array of experiences, folklore, customs, and traditions, which are central to the social and cultural life of a community. From this perspective, a virtual museum must acquire an innovative and functional dimension, going beyond the mere three-dimensional reproduction of objects or environments. Instead, it becomes a tool that allows users to fully understand the characteristics of a specific cultural testimony, placing it within a broader historical, cultural, and anthropological context, thus grasping its role and function more comprehensively. This vision, which should form the foundation of an innovative virtual museum aligned with the objectives of the protocol, was foresightedly anticipated as early as 1974 (Ragghianti 1974, 222) and later echoed by Antinucci in his work on virtual museums (Antinucci 2007, 136):

“Along the path of speculation, we can also, through drastic reversal, imagine a completely different museum, designed and constructed based on immediate, undeniable, and precise effects, that is, responding to the messages of the works on the spectator, even one who is not particularly prepared. A museum in which the visitor is immersed in a series of independent environments, each composed according to the

autonomous and individual reasons and visibility conditions of each artwork contained, thus restoring, from time to time, the artist's basic directive with the maximum possible rigor".⁹

As highlighted by Ragghianti, the possibility of a museum capable of subverting traditional standards and offering visitors personalized experiences was already proposed fifty years ago, anticipating concepts that are now extremely relevant.

These principles should form the basis for developing a tool with diverse characteristics and potentials, capable of integrating new technologies and adapting them to the different realities present in various regions of the world. A significant example is the increasingly widespread use of artificial intelligence (AI) in the context of the protection, monitoring, enjoyment, and promotion of global cultural heritage. The integration of AI and virtual museums allows for important outcomes, such as the creation of personalized experiences - a strategy already adopted by numerous museums - or the development of predictive models that can monitor and foresee potential damage to physical works preserved in museums worldwide. This is made possible through advanced simulation systems and sensors capable of detecting even minor changes in the works that are not visible to the human eye. In this perspective, the interaction between an innovative virtual environment and cultural heritage, both material and immaterial, emerges as a crucial element for safeguarding and enhancing the world's cultural heritage.

In analysing the role of virtual museums in areas marked by current or recently concluded conflicts, it is essential to focus on two fundamental issues related to virtual musealization: the perception of the virtual environment and data security. It is important to note that, while it is preferable to use the term "evidence" rather than "artifact" – since a virtual museum allows for the preservation of testimonies that are difficult to display in a physical museum, such as reproductions of a tomb or a building – the term "artifact" will be used in this context as it is conventionally adopted in museum discourse. Although these topics, along with ethics, require in-depth analysis, it is crucial to highlight some key aspects to better understand the role that a virtual museum can play both in the local community and globally. In particular, this involves examining the importance of visitor perception regarding virtual scenarios and the crucial role that data security plays in this context. Indeed, for the virtual experience to be immersive and engaging, it is essential that visitors can interact with the environment securely. This implies the need to ensure that the exchanged information and sensitive data are protected from potential risks, which is particularly relevant in virtual museums, where data management is as central as the quality of the digital reproduction of the evidence. Although data security is primarily a technical issue, it is useful to consider the advanced technologies used by platforms and websites that manage sensitive information. Such technologies ensure the protection and privacy of users. Tools such as firewalls (digital barriers that filter traffic to block unauthorized access), identity and access management (IAM) systems, encryption, and intrusion detection systems are commonly employed to prevent external attacks and malfunctions. It is essential that these technological solutions are also applied to virtual museums to safeguard the preserved data (including 3d models) and ensure a safe experience for users. Regarding the perception of virtual museums and the works they house, it is true that we are dealing with a more complex aspect, often influenced by the personal tastes of the visitor. However, we can cite numerous museums that have succeeded in evoking positive emotions and generating educational impact on their users through the development of digital platforms. This demonstrates that various effective strategies can be adopted to engage a broad audience, educating them and creating a positive impact on the community, even in the context of digital cultural heritage.

⁹ Translated from Italian by the authors, for a more detailed discussion see again Ragghianti 1974.

An example in this sense is represented by the virtual museum project conceived for the archaeological area of Seglamen, nearby Aksum, in Northern Ethiopia, which we will discuss shortly. To avoid unpleasant effects or negative emotions in visitors, two modes of interaction with the proposed works have been developed. The first, called “Showcase”, offers a traditional and immersive experience: the visitor is transported into a 360° 3D room, wherein one can move freely in first-person perspective and observe each individual object through interactive tools, making the visit participatory (Fig. 7).

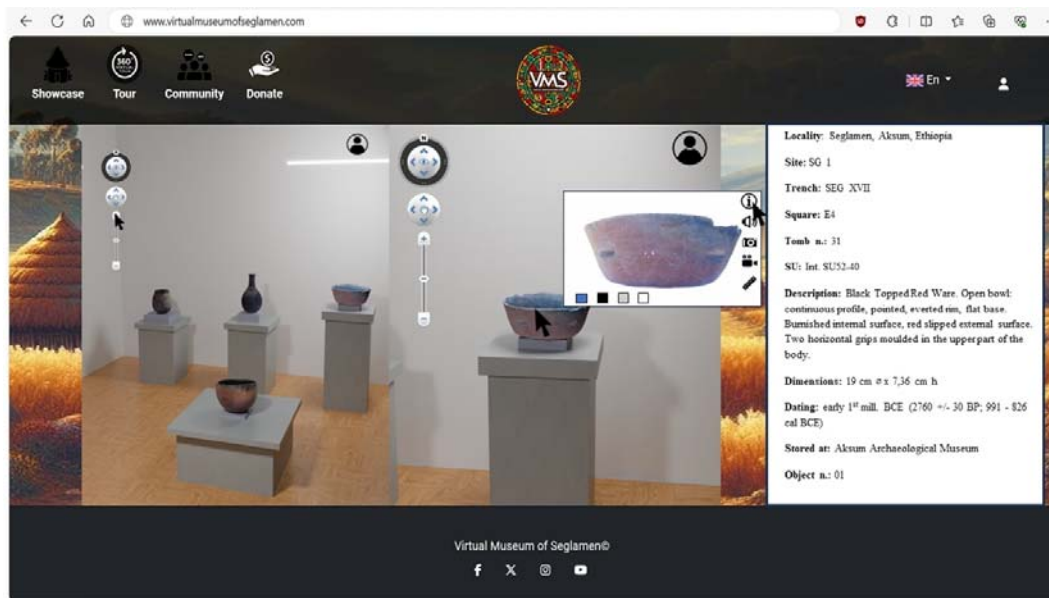


Fig. 7 – Seglamen, Virtual Museum Project, the “Showcase” mode

The second mode, termed “Tour”, is the main innovation of the project. Here, the user is immersed in virtual scenarios reconstructed in collaboration with the local community and utilizing the landscapes of the region. These scenarios, presented through 360° videos, reconstruct historical events and processes, allowing the user to appreciate the objects in their context and delve into the processes that led to their manufacture and use in the past (Fig. 8).

This two-folds approach aims at shaping an experience that evokes positive emotions in the visitors. Thanks to the use of innovative technologies, the Seglamen Virtual Museum would offer new and engaging experiences. The goal is not only to educate but also to stimulate reflection on important themes such as peace, war, history, humanity, and its relationship with the environment and culture.

To conclude, the relationship between the user and the digital object represents a crucial aspect in the context of virtual musealization. In an increasingly digitized cultural landscape that leans towards the use of AI, it is essential to overcome the traditional barriers that separate the public from the enjoyment of historical evidence. To achieve this goal the virtual musealization should not only employ advanced technologies but also integrate interactive and immersive strategies. Such strategies can facilitate a participatory experience, stimulating users’ curiosity and interest, ensuring that enjoyment does not remain a mere act of passive viewing. An innovative approach to virtual musealization must consider the adoption of interactive and narrative models that can attract visitors of different ages and backgrounds, making the educational experience more accessible and engaging. Through the use of technologies like augmented reality and virtual reality, it is possible to create dynamic environments in which users are not just observers

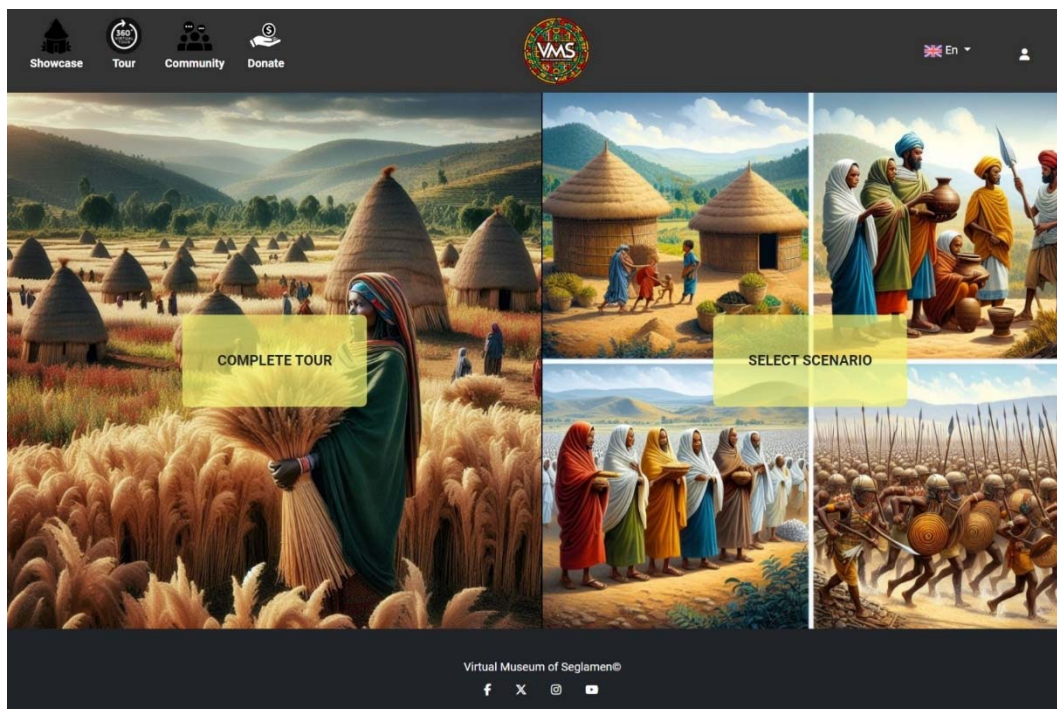


Fig. 8 - Seglamen Virtual Museum Project, the “Tour” mode

but active participants in the reconstruction of historical and cultural events. These environments, capable of evoking emotions and reflections, can break down the traditional barriers of musealization, making cultural heritage not only a field of study but also a source of inspiration and dialogue. Therefore, innovation in virtual musealization must not be limited to a mere digitization of works but should evolve into an approach that fosters interaction and connection between the user and cultural heritage. Only in this way will it be possible to build a meaningful bridge between the virtual museum and the visitor, making museum experiences more relevant and stimulating for future generations, ultimately developing new platforms that can ensure fundamental concepts like the enjoyment and safeguarding of world cultural heritage.

A particularly complex reality that urgently requires the definition of a dedicated protocol of heritage protection involves all those countries affected by conflicts or recently emerging from them. In these regions, historical, cultural, and archaeological heritage, along with the population, is constantly threatened by bombings, invasions, and acts of cultural terrorism aimed at erasing entire segments of historical and artistic memory, as witnessed during the two world wars or more recently in Iraq, in the cities of Baghdad and Mosul. In these contexts, a virtual museum can gain even greater relevance, evolving from a simple tool for the safeguarding and enjoyment of cultural heritage into a platform capable of conveying messages of understanding and mutual tolerance through immersive and engaging experiences. The creation of an interconnected network of virtual museums that can communicate with one another can prove to be an effective strategy to counter prejudice and promote educational and awareness campaigns on global cultural heritage, both material and immaterial, constantly at risk from conflicts, political instability, and large public and private works. Although physical museums have already played and will continue to play a crucial role in the political and social dynamics of conflict areas, they present intrinsic limitations due to their physical nature. The first and perhaps most significant of these is accessibility, understood as the

ability to freely access the museum even during periods of conflict.¹⁰ This feature is crucial in the case of virtual museums, as it allows anyone with an internet connection to access the museum at any time, regardless of the political situation in the region, the time of day, the visitor's geographical location, or any temporary or chronic health issues the user may have. Thus, accessibility translates into inclusion, communication, and the exchange of ideas - concepts that represent the beating heart of a healthy society aware of the value of its cultural heritage, both locally and in an international perspective, when this heritage is related to other cultures. The absence of physical barriers and the immaterial nature of these "non-places", understood as non-physical spaces, give virtual museums essential characteristics to implement strategies aimed at preserving at-risk cultures. A virtual museum is, in fact, an archive without shelves or walls, capable of preserving memories and anthropological, historical, artistic, and cultural testimonies related to both material and immaterial traditions and artworks, thus ensuring the safeguarding of their role in human affairs. This approach allows for continuous enjoyment of cultural heritage even when it is exposed to dangers or extreme situations. This characteristic should not be underestimated, as it can play a significant role in educating the public, who often overlook the critical conditions faced by essential elements of cultural heritage – considered as part of the heritage of Humanity – and the threats they encounter. These issues are not necessarily or directly linked to armed conflicts; they also include other processes that jeopardize the safeguarding of a region's heritage, such as neglect due to problems in managing archaeological and cultural sites. These challenges are a constant in countries facing or recently emerging from economic crises, which frequently occurs in nations involved in conflicts or that have just come out of them. The ability to raise awareness and inform the public about crucial issues concerning both local and global cultural heritage contributes directly to its promotion, often stimulating significant tourist flows.

A notable example, though from a different context, is the media impact of films such as *Lawrence of Arabia* and *Indiana Jones and the Raiders of the Lost Ark*. These movies, through effective storytelling, increased interest in regions like the Near East, generating notable tourism in areas previously infrequently visited. This methodology can be effectively applied today in the context of virtual musealization. By leveraging the power of the Internet, users worldwide can access resources related to the preservation and understanding of cultural heritage, fostering greater global awareness and participation in its protection. Technology plays a crucial role in conflict-affected areas, as achieving preservation, promotion, awareness, and education can be challenging in extreme contexts. However, an effective virtual musealization process can ensure the continuity of cultural heritage protection, enjoyment, and enhancement even in times of crisis. In this context, the transport of artworks, especially in regions facing insecurity or authoritarian regimes, poses significant challenges that can be addressed through virtual musealization and the creation of digital collections. Such limitations have often led to tensions between museums and governments. For instance, in 2011, the Louvre refused to loan the Mona Lisa to Florence due to security concerns (Larcan 2018). Similarly, in 2022, the National Museum of Damascus withheld a 7th-century manuscript, citing safety issues in Syria. These cases highlight how security concerns hinder artwork access and transfer, an issue significantly mitigated by virtual museums, which enhance accessibility while eliminating transportation and security costs. Although it is now evident that a proper approach to virtual musealization can contribute to the preservation, use, and monitoring of our cultural heritage, there is still an important aspect to consider: the economic one. The creation of a multimedia platform represents an additional opportunity to promote initiatives aimed at fundraising, both for heritage management and to support populations affected by crises or conflicts. In this way, besides reducing significant costs associated with

¹⁰ See e.g. the recent example of virtualization of the Sudan National Museum by the National Corporation for Antiquities and Museums and the Section Française de la Direction des Antiquités du Sudan: <https://archeologie.culture.gouv.fr/sudan-museum>.

managing a physical museum - especially in conflict contexts - the virtual museum becomes a tool capable of involving a broad and diverse community. It facilitates collaboration between experts and enthusiasts through the organization of online meetings and the dissemination of high-quality digital contents. This strategy addresses a highly relevant and timely issue, generating multiple outcomes with significant impacts on various aspects of the community, such as the economy (directly or indirectly linked to tourism), social cohesion, and culture. These mechanisms acquire added value especially in societies characterized by a fragmented social setting or marked by conflicts and crises.

After a general overview of the role of virtual museums in safeguarding, managing, and valorising cultural heritage, especially in conflict areas, this final section presents a virtual musealization proposal for the archaeological area of Seglamen, in the Tigray region of northern Ethiopia.

Located on a flat cultivated terrace about 12 km to the south-west of Aksum, the archaeological site of Seglamen has evidence dated to the first half of the 1st millennium BCE. Awareness of the possibility of an archaeological site in this area dating back to this period came about in the early 1970s, when a royal inscription commemorating the foundation of a temple was found by a farmer in the southeastern sector of the modern village.¹¹ Preliminary excavations aimed at detecting archaeological remains chronologically and culturally related to the inscription were carried out in 1974.¹² These brought to light evidence of a much later occupation of the area built over earlier structures (Ricci, Fattovich 1987, 117-169).

The actual location of the Pre-Aksumite settlement was determined in 2006, during the systematic survey of Aksum and its vicinities conducted in the framework of the World Bank Ethiopian Cultural Heritage Project (Bard *et al.* 2014, 285-316). The ancient site extends over an area of about 7 hectares in the easternmost sector of the modern village, overlooking the river gorge. It encompasses the present-day areas of Amda Tsion, where the ancient settlement was located, and Mogareb, north-west of the settlement, where the remains of the ancient cemetery have been detected and investigated.

Excavations conducted between 2010 and 2019 by UNIOR and ISMEO uncovered in the settlement area the remains of overlapping stone buildings belonging to three major occupational phases dated between ca. 980 and 450 BCE (Sernicola 2021, 150-152); investigations in the cemetery have so far exposed the remains of 37 tombs consisting of circular and roughly rectangular shafts, some of them marked by a sandstone stela. Small votive deposits characterized by shallow pits are located around the graves, in the proximity of outcropping natural boulders (Sernicola 2021, 150-154).

The economy of the ancient people inhabiting the site was based on the cultivation and processing of cereal and legumes and the breeding and butchering of cattle, sheep, and goats. A variety of crafts and possibly industrial activities were also performed at the site, including stone knapping, pottery making, cleaning and refining of animal skins, and wood-working (Phillipson 2012, 509-530; 2013*b*, 283-303). Imported materials suggest that the site was included in medium-to-long distance exchanges and trades with the Nile Valley and the Red Sea regions (Sernicola 2021, 149-150).

Two crucial aspects justify this choice of implementing a Virtual Museum of the site of Seglamen. First, the project is rooted in a long-lasting collaboration between the Ethiopian Governmental Institutions, UNIOR and ISMEO, ensuring a strong scientific foundation. Second, the region faces recurrent social challenges, such as ethnic fragmentation and economic underdevelopment, exacerbated by a recent conflict. This makes Seglamen particularly suitable for applying a virtual museum model that can address many of the challenges faced by the local community. Despite its small size and agriculture-based economy,

¹¹ See note 3.

¹² Investigations were conducted by Sapienza University of Rome under the direction of Lanfranco Ricci.

Seglamen holds significant evidence related to the emergence and evolution of complex societies in this region. Preserving these testimonies could foster cultural and socio-economic revitalization for the community.

The objectives of Seglamen Virtual Museum Project are clear and well-defined: access, accuracy, preservation, and information diversification. The goal is to go beyond simple 3D reproductions of museums or collections by creating a platform that allows users to interact with artifacts and immerse themselves in realistic environments recreated using advanced technologies like photogrammetry, 360° videos, and 3D modelling. The project aims to transform the museum experience into active learning, making users integral participants, engaging with the artifact and its context, while overcoming social and ethnic barriers (Fig. 9).



Fig. 9 - Seglamen Virtual Museum Project, Homepage

A key element of this project is the accurate profiling of users, allowing the information provided to be tailored based on each visitor's interests and expertise. This data diversification strategy prevents overloading the user with excessive information or offering a limited experience. It ensures a balanced and engaging experience, catering to various levels of knowledge while avoiding negative reactions from inadequate information loads. The adoption of real-world models also aims to actively involve the local community, encouraging their participation in creating digital contents. This exercise holds crucial importance, as the involvement of the local community not only offers opportunities for employment and education but also allows the community to connect deeply with its own history. This process encourages self-reflection, linking individuals with both their personal and collective heritage and, ultimately, with the broader regional context. Such an approach fosters a greater awareness of shared cultural values, strengthening identity and belonging to a universal culture that transcends political boundaries, which often serve as artificial divisions of a single people. To further enrich the museum experience, carefully selected audio, video, and photographic materials will be integrated, enriched with specific information. These elements will allow users to immerse themselves fully in the production or discovery context of an object, offering a learning experience that goes beyond mere observation. The digital supports not only facilitate user navigation within the scenarios but also mark a significant advancement in the evolution of the Seglamen Virtual Museum. By conveying brief yet meaningful messages filtered through various profiling

levels, the Seglamen museum can effectively narrate the history of a particular object through storytelling. The use of audio supports is not only an important resource for visually impaired users but also adds a sensory dimension, making the visit more immersive and engaging. Similarly, dedicating a specific space for children offers significant opportunities. By incorporating diverse approaches like educational games, the goal is to stimulate curiosity and create a welcoming environment that encourages exploration. The playful approach helps facilitate information transfer in an accessible way while promoting active engagement. The storytelling process aims to evoke curiosity, empathy, and wonder, creating a deep connection with cultural heritage. The project is based on the “concept-driven” approach, focusing on how visitors want and can interact with museum contents. In this context, a careful analysis of visitors’ interests and needs was of paramount importance in order to fully understand their expectations. Only through this investigation it has been possible to design a virtual museum that not only met these expectations, but was also an effective tool to promote essential values such as the preservation of heritage and its valorisation, in a territory marked by internal conflicts and high rates of poverty. The collection that was planned to be presented in our museum also reflects the policy of the project as a tool to mitigate conflicts. For instance, the idea of presenting ceramic types that are attested in this area as well as in the neighbouring territories of Sudan, Egypt and Eritrea, is dictated precisely by the aim of emphasising common and convergent cultural traits rather than divisive and distinctive ones. In this perspective, the objects in the collection also take on a new meaning: they become powerful tools for promoting the values of social cohesion and highlighting the intercultural relationships of the past. It is evident how all the choices behind the realisation of Seglamen Virtual Museum are guided by a common ultimate goal, although the specific objectives are different. The strategies implemented in the museum, such as the use of audio-visual gimmicks, 3D manipulation and accurate storytelling, serve as a guiding tool to help the visitor orientate and move within the history of the region in an active way.

To conclude, it is useful to recall once again the words of Antinucci: “The museum is perceived also, and not secondarily, with the body and not only with the eyes: one moves through the rooms, around and in front of the objects, one has a sense of position and space – crucial in the perception of volumes, of sizes – that contributes fundamentally to the appreciation of the experience one is having [...]. The common visitor, especially today’s visitor, must be taken by the hand and guided along a safe path, where he does not have to choose between things about which he does not know and cannot choose, and where the information that is truly essential to the understanding of the object in front of him is communicated in a comprehensible manner, in an effective and also captivating way, that is, aimed at stimulating motivation.”¹³

These principles form the foundation of the Seglamen Virtual Museum, which, while allowing freedom of movement and access to information, ensures that the user is never alone. Information is presented in a way that is filtered and adapted to the specific needs of the user, ensuring an experience that is as engaging and informative.

Final remarks

Safeguarding heritage, both tangible and intangible, is a challenge we cannot shirk to ensure that the cultural legacy of our predecessors is passed on to future generations. It involves a set of well-established and standardized procedures nowadays complemented by a rich variety of digital tools that help making documentation, protection and promotion faster and more efficient. They prove to be extremely useful in those areas that are inaccessible due to environmental conditions or the occurrence of periods of conflict

¹³ This passage summarizes concepts expressed by Antinucci in several of his writings, but which are most clearly and concisely presented in Antinucci 2007, pp. 104-121.

and political instability as they speed up data collection and facilitate the remote monitoring of sites and tracking of objects involved in illegal trafficking. In addition, the possibility of creating virtual museums – as an alternative or complement to real museums– constitutes a unique opportunity to disseminate the cultural heritage of conflict-prone regions. This can help in raising international awareness of the richness of the cultural heritage of these areas and the need to protect it.

Taking action to mitigate the impact of conflicts on the cultural heritage of northeastern Africa and the Horn is increasingly becoming a priority step in the archaeological research programmes that UNIOR and ISMEO conduct in Egypt, the Eritrean-Sudanese lowlands, and Ethiopia. Attention to this aspect is leading to the experimentation, sometimes planned and sometimes opportunistic, of tools and procedures that will hopefully contribute to generating a protocol of systematic actions geared towards the protection and promotion of the rich and varied heritage of these regions.

Acknowledgements

The UNIOR-ISMEO archaeological research projects in Egypt, the Eritrean-Sudanese lowlands and Ethiopia presented in the text are funded by the Italian Ministry of Foreign Affairs and International Cooperation, the University of Naples L’Orientale and The International Association for Mediterranean and Oriental Studies.

The authors are extremely grateful to all team members, students, local institutions, collaborators and workers for their support and their contribution to the progress of the research.

The Seglamen Virtual Museum Project was realised in collaboration with Dr Augusto Palombini, CNR - Istituto di Scienze del Patrimonio Culturale.

REFERENCES

- Antinucci, F. (2007) *Musei virtuali. Come non fare innovazione tecnologica*. Bari.
- Bard, K.A., R. Fattovich, eds. (2007) *Harbor of the Pharaohs to the Land of Punt: Archaeological Investigations at Mersa/Wadi Gawasis, Egypt, 2001-2005*. Napoli.
- Bard, K.A., R. Fattovich, A. Manzo, C. Perlingieri (2014) The Chronology of Aksum (Tigray, Ethiopia): A View from Bieta Giyorgis, *Azania* 49/3, pp. 285-316.
- Bard, K.A., R. Fattovich, A. Manzo, eds. (2022) *Harbor of the Pharaohs to the Land of Punt II: Archaeological Investigations at Mersa/Wadi Gawasis, Egypt, 2006-2011*. Napoli.
- Bard, K.A., A. Manzo 2025 Excavations on Bieta Giyorgis Hill, Aksum and Evidence for the Origins and Development of the Aksumite Kingdom, *Journal of Field Archaeology* 50, pp. 239-259.
- Bernand, É., A.J. Drewes, R. Schneider (1991) *Recueil des inscriptions de l’Éthiopie des périodes pré-axoumite et axoumite. I: Les documents*. Paris.
- Bragantini, I., G. Lucarini, A. Manzo, R. Pirelli (2018) *The Italian Archaeological Mission in the Eastern Desert: First Results from the Area of Wâdi Gasus, in The Eastern Desert of Egypt during the Greco-Roman Period: Archaeological Reports*. Paris.
- Fattovich, R., K.A. Bard, L. Petrassi, V. Pisano (2000) The Aksum Archaeological Area: A Preliminary Assessment. *Working Paper* 1. Napoli.
- Fattovich, R., Takla Hagos (2005) *Archaeological Survey – Report of Activity, October-November 2005*. [Technical Report]. Florence.

- Fattovich, R., Takla Hagos (2006) *Archaeological Survey – Report of Activity, March-May 2006 and Aksum World Heritage Site Management Plan*. [Technical Report]. Florence.
- Larcán, L. (2018) Louvre, “Prestare la Gioconda di Leonardo non è più un tabù”. Il ministro francese cambia le regole. *Il Messaggero*
https://www.ilmessaggero.it/primopiano/esteri/louvre_prestare_la_gioconda_di_leonardo_non_e_piu_un_tabu_il_ministro_francese_cambia_le_regole-3510911.html [29 gennaio 2018].
- Manzo, A. (2017) *Eastern Sudan in its Setting: The Archaeology of a Region Far from the Nile Valley*. Oxford.
- Phillipson, L. (2012) Grindstones and related artefacts from Pre-Aksumite Seglamen, northern Ethiopia and their wider implications, *Azania* 47/4, pp. 509-530.
- Phillipson, L. (2013a) Lithic Tools Used in the Manufacture of Pre-Aksumite Ceramics, *Azania* 48/3, pp. 380-402.
- Phillipson, L. (2013b) Parchment production in the first millennium BC at Seglamen, northern Ethiopia, *African Archaeological Review* 30/3, pp. 283-303.
- Ragghianti, C.L. (1974) *Arte, fare e vedere. Dall'arte al museo*. Firenze.
- Ricci, L., R. Fattovich (1987) Scavi archeologici nella zona di Aksum. A. Seglamen, *Rassegna di Studi Etiopici* 30, pp. 117-169.
- Schofield, E.J., ed. (1991) *Interpreting Artefact Scatters: Contributions to Ploughzone Archaeology* (Oxbow Monographs in Archaeology 4). Oxford.
- Sernicola, L. (2017) *Ancient Settlement Patterns in the Area of Aksum (Tigray, Northern Ethiopia) – ca. 900 BCE – 800/850 CE* (BAR International Series 2860). Oxford.
- Sernicola, L. (2021) On the origins of Aksum and the “Proto-Aksumite Culture”: an overall reconsideration in the light of recent finds at Seglamen and Medogwe, *Rassegna di Studi Etiopici* 5 (Terza Serie), pp. 139-175.

A Mosque at Khor Rori. New Evidence for the Islamic Period in Coastal Dhofar

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Abstract

Along the southern coast of Oman, the ancient, fortified town of Sumhuram stands in a landscape rich in archaeological remains. Between 1996 and 2019, the Italian Mission to Oman (IMTO, University of Pisa) carried out extensive investigations at the site and in its surrounding territory. With the aim of reconstructing settlement patterns across different periods, the research examined several structures, including a mosque located on the bank of the lagoon formed by wadi Darbat. Although its precise dating remains uncertain, the mosque represents a small yet meaningful addition to the corpus of Islamic-period evidence from coastal Dhofar. This paper presents the mosque's architectural features and associated finds and discusses possible interpretations of its isolated location.

Keywords: Khor Rori, Islamic Archaeology, mosque, Archaeology of Dhofar, Sultanate of Oman

Citation: Pavan, A., A Mosque at Khor Rori. New Evidence for the Islamic Period in Coastal Dhofar, *Archeologie tra Oriente e Occidente*, vol. 3-4, pp. 79-89, <https://doi.org/10.6093/archeologie/13095>

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Introduction

Between the late 1990s and 2019, the Italian Mission to Oman (IMTO), under the direction of A. Avanzini (University of Pisa) conducted a long-term programme of archaeological research in the Dhofar Governorate, the southernmost region of the Sultanate of Oman, focused on the fortified town of Sumhuram (2nd century BC - 5th century AD; see Avanzini 2008, 2014; Pavan, Degli Esposti 2016; Buffa 2019) and its surrounding landscape (Fig. 1). In collaboration with the Office of the Adviser to His Majesty the Sultan for Cultural Affairs,¹ the mission undertook not only large-scale excavations inside the settlement, but also investigations in the area outside the city walls.²

Since 2018, new archaeological work has been undertaken under the direction of S. Lischi, currently concession holder for the area of Khor Rori, on the eastern promontory of Inqitat (al-Hamr al-Sharqiya) and in other areas of the Archaeological Park.

At Inqitat, IMTO campaigns in 2000 and 2001 identified two main phases of occupation, dated to the 10th century and to the transition between the late 10th and early 11th century (Avanzini *et al.* 2001, 49-59; Rougeulle 2008). Recent investigations, however, have provided new evidence for the use of the area over a broader chronological span, from the Bronze Age to the medieval period (Lischi 2019a, b, 2023).

Alongside these projects, a distinct line of research is carried out by the Italian Archaeological Mission of the University of Naples L'Orientale at Al Baleed and in the Dhofar region (IAMOB), directed by R. Giunta. The excavation and study of Al Baleed form the core of the mission's activities, but its scope also extends to the Islamic-period history of Dhofar more broadly. Within this framework, the study of the

¹ The Office of the Adviser to His Majesty the Sultan for Cultural Affairs ceased operations in 2020 and its functions were taken over by the Ministry of Heritage and Tourism of the Sultanate of Oman.

² These included the exploration of structures contemporary with the settlement - such as the lagoon-side temple (Pavan, Sedov 2008), several cave tombs carved into rocky outcrops north of the town, and a number of rectangular buildings to the east of Sumhuram, plausibly linked to agricultural activities. The latter are also attested in the wider territory by channels and small dams (Cremaschi, Negrino 2002; Cremaschi, Perego 2008, 567).

present mosque finds its place,³ together with a series of coastal surveys already undertaken (Giunta, Pavan 2022; Pavan 2024), and further investigations that are planned, including a survey in the inland area of wadi Nashib, where Islamic-period structures have been identified that may be connected to the little-known Manjawi (Minjuid, Manjuid) dynasty (Aston 2022, 2023) and a remote sensing survey in the area of Hasik.

Location and architectural features of the building

In January 2006, during the intensive geo-archaeological survey carried out by M. Cremaschi and A. Perego (2008), which recorded more than one thousand sites in the Khor Rori area, a concentration of well-dressed masonry blocks was observed about 1.2 km south-east of the ancient city of Sumhuram. This suggested the presence of one or more buildings. As part of the broader research undertaken by the University of Pisa at Khor Rori, aimed at a diachronic reconstruction of settlement patterns in the region, the remains of this structure were investigated.

The location was named as KR1182 and it was marked by the coordinates 17.03633N, 54.43964E (Fig. 1, top right).

The blocks lay on one of the branches of the lagoon formed by wadi Darbat, a seasonal river originating in the Jebel Qara region and flowing into the Indian Ocean, where it creates a lagoon. This lagoon, fed by karst springs, was once open but became closed by a sandbar that formed between the 3rd and 5th centuries AD (Hoorn, Cremaschi 2004, 27-28, fig. 12,3). Even today, the sand barrier is seasonally breached during the monsoon, when the increased water flow temporarily reconnects the lagoon with the sea.

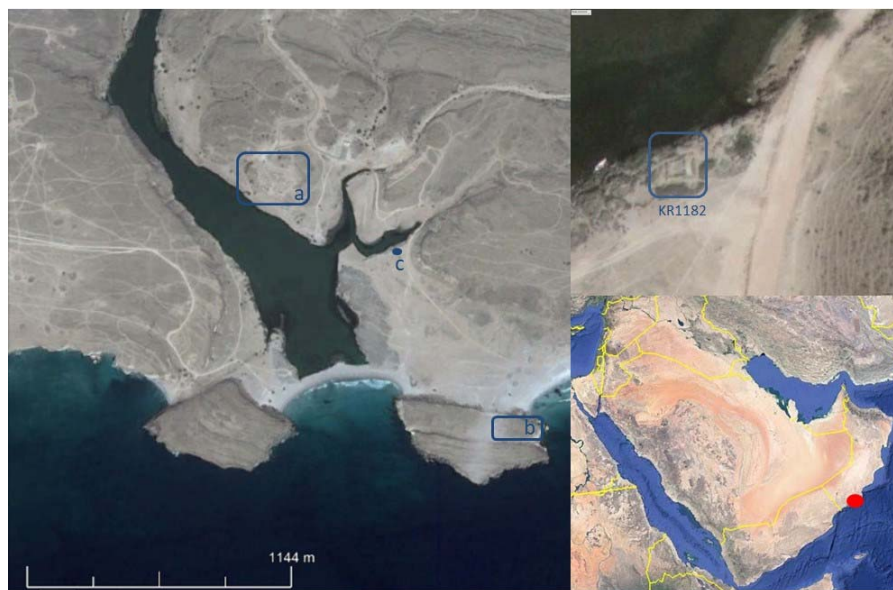


Fig. 1 - Left: the territory of Khor Rori with indication of the sites mentioned in the text: a) the settlement of Sumhuram, b) the settlement of Inqitat, c) the site KR1182; Top right: close-up of KR1182 with the remains of the mosque; Bottom right: the Arabian Peninsula with marked the region of Dhofar (elaboration from Google Earth by the author)

³ This study was supported by the PNRR (National Recovery and Resilience Plan) project *Italian Strengthening of ESFRI RI Resilience* (ITSERR), funded by the European Union - NextGenerationEU (CUP: B53C22001770006). Thanks to this support, it has been possible to resume the study of material concerning the religious practices and contexts of the Nile Valley and beyond. The author served as Field Director for the Italian Mission to Oman (IMTO) during the excavation of the mosque at Khor Rori and is now Deputy Director of the Archaeological Mission of the University of Naples L'Orientale at Al Baleed and in the Dhofar region (IAMOB).

Prior to excavation, only limited wall alignments were discernible in the northern and north-western sectors of the building, whereas the eastern side was characterized by substantial accumulations of dressed and undressed stones, darkened by the so-called “desert dust” (Fig. 2). These accumulations are plausibly the result of the building’s collapse and appear to represent the residual material left after the systematic removal of well-dressed blocks, which were most likely extracted for reuse in later constructions in the surrounding area. The blackening of the stones, despite its name of “desert dust”, finds its reason in the action of micro-organisms belonging to the family of black fungi and it is typical of the ancient surfaces of the area which have been exposed to the atmospheric agents for a long time (Orazi 1997).

Beside the masonry blocks, architectural elements such as fragmentary pillars, elements of simple capitals and/or bases, dressed stones with intentional holes and portions of basins for the collection and conservation of water were found scattered in the area (Fig. 3).

In order to clarify the lay-out, function, and chronology of the structure, a short excavation campaign was carried out in March 2006 by the Italian Mission to Oman (IMTO), directed by the author in collaboration with Said Al Mashani, then Supervisor of the Archaeological Park of Khor Rori. Prior to excavation, different hypotheses had been proposed about the nature of the remains: they might represent a landing facility, an *extra moenia* temple comparable to the one discovered west of Sumhuram (Pavan, Sedov 2008), or, alternatively, a later but as yet undetermined construction.

The building

The excavated structure was built using sandstone masonry blocks, some carefully dressed, and others only roughly worked, still bearing distinct chisel marks. No traces of mortar were detected, which suggests that the walls were either constructed dry or employed a clay-rich mortar that has since completely deteriorated. The use of sandstone as a building material, instead of the limestone commonly employed at Sumhuram and in contemporary structures of the surrounding area (Pallecchi, Pavan 2011), was taken as



Fig. 2 - The area before the works in 2006 (photo A.V. Sedov, ©IMTO)



Fig. 3 - Fragment of monolithic pillar (photo by the author, ©IMTO)

an immediate indication of a possible chronological discrepancy between this building and the pre-Islamic remains of the area. This interpretation was confirmed within just a few days of excavation, when the identification of a *mihrāb* niche in the western (*qiblī*) wall clearly indicated that the structure was a mosque (Fig. 4).

The structure was erected on a natural bedrock platform, which had been possibly levelled and regularised by human intervention. Excavations along the northern perimeter wall, near the north-eastern corner, brought to light a staircase with four preserved steps; the area immediately adjacent to the north-eastern corner, however, has not yet been excavated. The stairway descends toward the lagoon's water level and was most likely designed to provide access to the water required for ablution practices. No additional spaces or installations that could be associated with



Fig. 4 - General view of the mosque after the excavations (photo by the author, ©IMTO)

ablution activities were identified, apart from a few fragments of basins recovered among the collapsed ruins. Likewise, no clear traces of a minaret were documented.

According to the architectural evidence, two main constructional phases were distinguished. The analysis of the archaeological deposit, however, indicates that these phases succeeded one another within a relatively limited timeframe, suggesting that the modifications formed part of a continuous sequence of use rather than reflecting a prolonged abandonment or a subsequent large-scale reoccupation. No traces of fire or other destructive events have been observed, further supporting this interpretation.

The first constructional phase

In its first constructional phase, the building presents an irregular and somewhat atypical plan, with walls following a slightly oblique alignment, giving the structure the outline of an irregular quadrilateral (Fig. 5). This configuration was most likely conditioned by the local topography rather than by an intentional architectural design.

The walls were 0.70-0.75 m thick, with the *qiblī* wall slightly broader (about 0.90 m) to accommodate the *mihrāb* niche within its thickness, avoiding any projection on the exterior face (Fig. 6). The *mihrāb* was a simple semicircular niche, 0.8 m wide and 0.6 m deep, set in the centre of the inner face of the western wall. It showed no architectural framing or decorative treatment, and its orientation diverged from the exact qibla, presenting instead a marked deviation of about 30 degrees, corresponding to a precise alignment toward the west.

Despite the very poor preservation and the low height of the surviving walls, a close examination of the wall partitions nevertheless suggests the existence of two entrances, one to the south and another to the east.

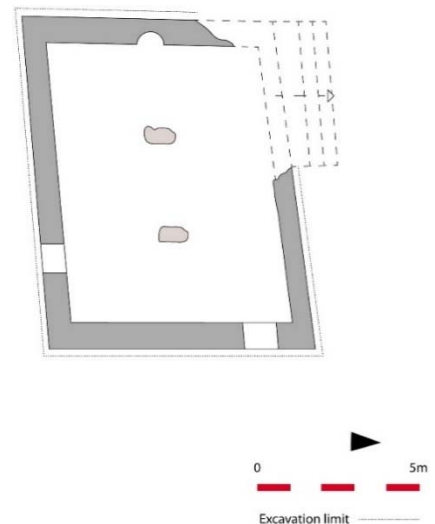


Fig. 5 - Plan of the mosque, first phase (drawing by A. Antonelli)

The floor of the room was carefully plastered with a thick layer of white mortar, whose bright colour suggests the use of a high proportion of gypsum.



Fig. 6 - The *mihrāb* in the *qiblī* wall (photo by the author, ©IMTO)

Along the main central axis, two sandstone slabs measuring ca 1×0.40 m, set 2.85/3.0 m apart, likely served as pillar bases for the roof, which was most probably flat. The pillars were probably monolithic rather than composed of separate elements, as suggested, if correctly interpreted, by the fragments recovered in the deposits along the sides of the mosque (see above, Fig. 3). This arrangement may have divided the interior into three aisles.

The second constructional phase

During the second constructional phase, the earlier structure was reshaped by lowering most of its walls to form a platform, within which new parallel walls were inserted (Fig. 7).

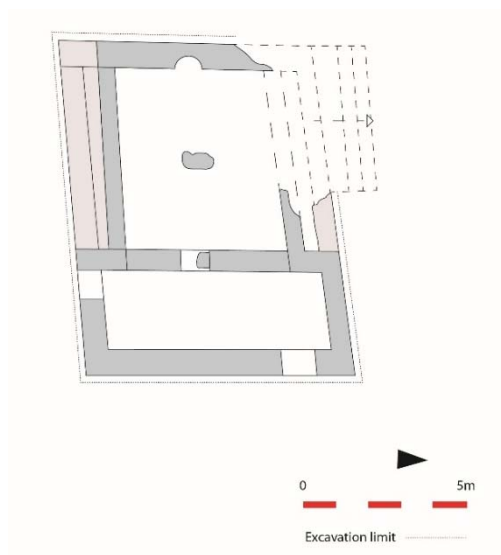


Fig. 7 - Plan of the mosque, second phase (drawing by A. Antonelli)



Fig. 8 - Pillar base at the centre of the prayer room (photo by the author, ©IMTO)

Only the *qiblī* wall remained unchanged. As a result, the mosque acquired a new layout consisting of two main parts: a prayer hall, irregularly square in plan and measuring 4.5-4.8×5.3-5.6 m, and an elongated gallery/courtyard to the east, measuring 2.25-2.5×8.6 m and oriented along a north-south axis, which corresponded to the easternmost aisle of the earlier structure. Access to the prayer hall was through this space, aligned with the *mihrāb*. Of the pillar bases from the earlier structure, the one closest to the *mihrāb* was left in place and re-used as the central element of the new prayer room (Fig. 8). The eastern base, by contrast, was partly covered by the north-south wall that defined the smaller prayer hall and was partially reused as the threshold giving access to the room. Given the limited size of the space, the presence of a single pillar was sufficient to support the roof and to articulate the interior without requiring additional supports.

Pottery and Small Finds

Inside the building, only very shallow deposits and a limited amount of archaeological material were preserved, as the low standing walls were insufficient to protect the area from erosion and deflation. The stratigraphic sequence consists solely of a thin Aeolian layer (SURF) overlying a moderately compact loam deposit, mixed with small- and medium-sized stones, with an overall thickness of about 0.5 m (SU1).

The presence of a fireplace was suggested by thin ash lenses and a few flecks of charcoal identified in the filling of the gallery, just a few centimetres above the well-plastered floor. A small quantity of animal bones, together with several marine shells, was recovered in association with the fireplace, possibly indicating the consumption of food within the mosque.⁴ It is uncertain, however, whether the fireplace might relate to the second phase of the building or rather to a later reuse of the ruins as a shelter.

Few pottery sherds, which are mostly barely identifiable walls, were unearthed together with the rim and part of the globular body of a cooking pot made in a Shell ware (Fig. 9). This fabric is a typical marker of the pottery from Dhofar since the so-called Local Iron Age (Zarins 1997, 664; Pavan 2017, 29-30) but it became widespread during the whole Islamic period (Fusaro 2019, 132), being used until today for the very limited local production (Fusaro 2020).

Moreover, one of these pottery sherds presents an extremely characteristic decoration comprising impressed motifs with the shape of rice grains which identify a well-known category of pottery spread in southern Oman (Newton, Zarins 2017, 42, 46-47).

During surface cleaning, alongside several pillar fragments with rectangular shafts (including one with a rectangular capital), a squat pillar-shaped incense burner, roughly chiselled, was uncovered (Inv. No. S2, Fig. 10). With the exception of its base, all surfaces are completely blackened, a condition attributable to prolonged exposure to atmospheric agents rather than to ancient burning, as already noted for the construction blocks. The burner, carved in limestone, rests on a base forming a torus-like moulding and bears a second protruding element at the top (h. 4.5 cm; th. 1 cm) that functions as a rim and delimits the upper recess (depth 2.5 cm). Both the rim surface and the recess are flat and only roughly finished. A large



Fig. 9 - Rim of cooking pot in shell-tempered ware (photo by the author, ©IMTO)

⁴ Such a practice is also reported at Al Baleed, where religious buildings may have served as hostels or places of private worship (Newton, Zarins 2017, 73-74).

oblique fracture on the upper part removed much of the rim and part of the stem. This incense burner is remarkable for several reasons: not only does it reproduce the form of an architectural element, but specifically that of a column with circular section – an extremely rare feature in southern Oman, where columns are usually rectangular or octagonal in plan.⁵



Fig. 10 - The pillar-shaped incense burner S2 (photo by the author, ©IMTO)



Fig. 11 - The board game/*mancala* S1 (photo by the author, ©IMTO)

A second object (Inv. No. S1, Fig. 11) was recovered during the removal of SU1 inside the gallery leading to the prayer hall (second construction phase). It is a rectangular sandstone slab bearing small circular depressions arranged on one of its main faces in a 7×3 grid. Due to a corner fracture, one of the long sides preserves only four depressions, while one of the short sides has just two. The slab can be identified as a gaming board (*mancala*), frequently encountered in medieval archaeological contexts in Dhofar and representing valuable evidence of recreational practices in that period. Several comparisons can be found in similar objects discovered at Al Baleed, Wubar⁶ and in the latest deposits of Sumhuram (Pavan 2023, 125, fig. 11). While most of them are currently exhibited or stored the Museum of the Frankincense Land, Salalah, Sultanate of Oman, one was re-employed as construction block in the masonry of the citadel of Al Baleed and it is still *in situ*. As evidenced also by the occurrence of this kind of findings along the seashore of Salalah (Charpentier *et al.* 2014), these board games are generally associated with the Ottoman period.

Conclusions

The discovery and excavation of the mosque at Khor Rori represents a valuable addition to the Islamic-period record of coastal Dhofar, a region where, unlike the earlier phases of occupation, now increasingly understood in terms of settlement dynamics, coastal - hinterland interactions, and relations between local groups and external populations (Lischi 2023), evidence for the medieval period remains sparse and fragmentary. At present, the available data are insufficient to clarify when Islamic occupation began or how it developed in the region.⁷ As a result, the chronology of most of the settlements remains uncertain, making

⁵ See for example the columns in the Great Mosque of Al Baleed (Costa 1979).

⁶ Some board games (ID0264 and ID0263) are currently exhibited at the Museum of the Frankincense Land, Salalah, Sultanate of Oman.

⁷ Although numerous medieval sites were recorded during the Transarabia Survey (1990-1995; Zarins 2001) and later during the Dhofar Survey led by J. Zarins and L.S. Newton (Zarins 2007; Newton, Zarins 2010; Newton, Zarins 2017, 42-52), only a limited

it difficult to reconstruct the distribution and occupational dynamics of Dhofar from the decline of the caravan kingdoms, marked locally by the abandonment of Sumhuram in the 5th century AD (Buffa 2019, 247-273; Pavan 2023), throughout the Islamic period. The chronological framework of medieval settlement in coastal Dhofar remains far from clear. Even the foundation date of Al Baleed, the largest site in the region and one of the most important in Southern Arabia during the medieval period, is still uncertain despite numerous, though not continuous, excavations over the past seventy years (Giunta 2021).

Similarly, the mosque at Khor Rori cannot yet be securely dated: the excavated materials do not allow attribution to a specific chronological range, and stratigraphic evidence indicates that the two construction phases followed one another within a short span of time.

Closely connected to this chronological uncertainty is the question of whether the mosque functioned as an isolated building or was related to a nearby settlement. The most immediate hypothesis is a connection with the site of Inqitat/al-Hamr al-Sharqiya (see above and Fig. 1); however, the mosque lies about 2 km away from the settlement, a distance that makes such an association problematic. Within Inqitat itself, no mosque has so far been identified – only a “house with patio,” a “palace,” and some “stores” have been excavated – though only a small portion of the site has been investigated (see the plan in Avanzini *et al.* 2001, 51, fig. 45). Its location along the lagoon and near a freshwater spring could suggest a deliberate choice, providing easier access to water for ablutions.

Another possibility is a link with the Islamic occupation of Sumhuram, which material evidence broadly places between the 9th and the 12th-13th century, though the later horizon (12th-13th century) appears more plausible (Pavan 2023). Yet this occupation seems scattered and partial, lacking the architectural structures documented at Inqitat, and the ceramic assemblages from the two sites display clear differences. Taken together, these elements suggest that the two occupations reflect distinct modes of territorial use and likely belong to different chronological phases, rather than representing a single, continuous horizon.

There is, however, a third hypothesis, connected with the presence in Dhofar of shrines and distinctive buildings associated with figures of particular religious prestige.⁸ As in the case of some religious buildings located in the surroundings of the town of Al Baleed, it is possible that the mosque in the area of Khor Rori was a holy enclave which could provide protection in case of problems among tribes or a place where people could take an oath in case of agreements.

An alternative explanation is that the mosque functioned as a place of prayer for people passing through the area, its location recalling the practice – attested in different periods – of establishing simple open-air spaces for worship in strategic or accessible spots. The presence of a modern *muşalla* on the rocky spur behind the mosque, documented in July 2025, may offer a useful parallel for such a use of the site.

As such, it could have represented a welcoming sign from the communities living in the area, also considering that accessing the holy places possibly present inside the settlements, Inqitat and Sumhuram, would have not been easy, given both were walled and, the first, in an elevated position. It is interesting to note that this interpretation would imply some (indeed speculative) sort of continuity in an attitude towards the foreigners already mirrored in the construction of *extra moenia* temple along the lagoon (Pavan, Sedov 2008), as well as in the construction of a water supply accessible from outside the city walls at the time of Sumhuram (Degli Esposti, Pavan 2020).

number have been investigated through archaeological excavation (Albright 1982; Avanzini *et al.* 2001; Rougeulle 2008; Agostini 2013). See also the more recent survey along the Dhofari coast, made by the team of the Italian Archaeological Mission at Al Baleed, which specifically focused on Islamic sites (Giunta, Pavan 2022, 5-10; Pavan 2024).

⁸ For a discussion about role and functions of *mashayikh* and connected places see Newton 2010, 333.

Acknowledgements

This work was supported by the PNRR (National Recovery and Resilience Plan) project *Italian Strengthening of ESFRI RI Resilience (ITSERR)*, funded by the European Union - NextGenerationEU (CUP: B53C22001770006). The project made it possible to resume the study of material related to the religious practices and contexts of the Nile Valley and beyond. I am grateful to Michele Degli Esposti for revising the text and for his valuable comments. My thanks also go to Amanda Antonelli, who undertook the challenging task of reconstructing the plan several years after the excavation, producing the drawings used in the paper. I also wish to thank the former Italian Mission to Oman, under whose auspices the research was originally funded and carried out, and Said Al Mashani for his collaboration during the excavation and for drawing my attention back to this material.

REFERENCES

- Agostini, A. (2013) Campagna di scavo a Khor Mughsayl (Dhofar, Sultanato dell'Oman). Note preliminari, *Scienze dell'Antichità* 19, pp. 89-106.
- Albright, F.P. (1982) *The American Archaeological Expedition in Dhofar, Oman, 1952-1953* (The American Foundation for the Study of Man 6). Washington DC.
- Aston, W. (2022) The enigmatic Minjui. Potential Traces of a Forgotten Dynasty in Dhofar. [Available at https://www.academia.edu/83225362/The_Enigmatic_Minjui_Potential_traces_of_a_forgotten_dynasty_in_Dhofar].
- Aston, W. (2023) Possible Ancient Historical Connections in Dhofar, *The IASA Bulletin* 30, pp. 21-22.
- Avanzini, A. ed. (2008) *A Port in Arabia between Rome and the Indian Ocean (3rd C. BC-5th C. AD)* (Khor Rori Report 2). Rome.
- Avanzini, A. (2014) Un port d'Arabie entre Rome et l'Inde, *Comptes Rendus des séances de l'Académie* 1, pp. 483-505.
- Avanzini, A., V. Buffa, A. Lombardi, R. Orazi, A.V. Sedov (2001) Excavations and restoration of the complex of Khor Rori interim report (October 2000-April 2001), *Egitto e Vicino Oriente* 24, pp. 5-63.
- Buffa, V. (2019) Stratigraphy, chronology of Sumhuram. In V. Buffa (ed.), *Sumhuram. The becoming of the town* (Khor Rori Report 4, Arabia Antica 16), pp. 247-273. Rome.
- Buffa, V., ed. (2019) *Sumhuram. The becoming of the town* (Khor Rori Report 4, Arabia Antica 16). Rome.
- Charpentier, V., A. De Voogt, R. Crassard, J.-F. Berger, F. Borgi, A. Al Mashani (2014) Games on the seashore of Salalah: the discovery of mancala games in Dhofar, Sultanate of Oman, *Arabian Archaeology and Epigraphy* 25, pp. 115-120.
- Costa, P.M. (1979) The Study of the City of Zafar (Al-Balid), *Journal of Oman Studies* 5, pp. 111-150.
- Crevaschi, M., F. Negrino (2002) The frankincense road of Sumhuram: palaeoenvironmental and prehistorical background. In A. Avanzini (ed.), *Khor Rori Report 1, Arabia Antica 1*, pp. 325-363. Pisa.
- Crevaschi, M., A. Perego (2008) Patterns of land use and settlements in the surroundings of Sumhuram. An intensive geo-archaeological survey at Khor Rori: report of field season February 2006, In A. Avanzini (ed.), *A Port in Arabia between Rome and the Indian Ocean (3rd C. BC-5th C. AD)* (Khor Rori Report 2, Arabia Antica 5), pp. 563-607. Rome.
- Degli Esposti, M., A. Pavan (2020), Water and Power in South Arabia: The Excavation of "Monumental Building 1" (MB1) at Sumhuram (Sultanate of Oman), *Arabian Archaeology and Epigraphy*. [<https://doi.org/10.1111/aae.12159>].
- Fusaro, A. (2019) New Project on Islamic Ceramics from al-Balīd: Chronology, Technology, Tradition, and Provenance, *Proceedings of the Seminar for Arabian Studies* 49, pp. 129-146.

- Fusaro, A. (2020) The Islamic Port of al-Balīd (Oman), between Land and Sea: Place of Trade, Exchange, Diversity, and Coexistence, *Journal of Material Cultures in the Muslim World* 1, pp. 67-95.
- Giunta, R. (2021) Zafār/Al-Balīd: Dating Issues and Main Evidence between 11th-14th Centuries, *Newsletter di Archeologia CISA* 12, pp. 15-22.
- Giunta, R., A. Pavan (2022) First Archaeological Activities by the University of Naples L'Orientale in Dhofar, Sultanate of Oman, *Archeologie tra Oriente e Occidente* 1, pp. 1-10.
- Hoorn, C., M. Cremaschi (2004) Late Holocene paleoenvironmental history of Khawr Rawri and Khawr Al Balid (Dhofar, Sultanate of Oman), *Paleogeography, Paleoclimatology, Paleoecology* 213, pp. 1-36.
- Lischi, S. (2019a) Dal Paleolitico al Periodo Islamico: la Storia del Dhofar attraverso lo studio archeologico dell'Inqitat, In D. Frenez, M. Cattani (eds), *Sognatori. 40 anni di Ricerche Archeologiche Italiane in Oman*, pp. 149-151. Roma.
- Lischi, S. (2019b) Risultati preliminari delle ricerche archeologiche presso l'insediamento HAS1 di Inqitat, Dhofar (2016-2019), *Egitto e Vicino Oriente* 42, pp. 119-133.
- Lischi, S. (2023) A First Definition of the Dhofar Coastal Culture Archaeological Exploration on the Inqitat Promontory in the Khor Rori Area (Dhofar, Sultanate of Oman), *Ancient Civilizations and Cultural Resources* 1, pp. 23-38.
- Newton, L.S. (2010) Shrines in Dhofar. In L. Weeks (ed.), *Death and Burial in Arabia and Beyond. Multidisciplinary Perspectives*, pp. 329-340. Oxford.
- Newton, L.S., J. Zarins. (2010) Preliminary Results of the Dhofar Archaeological Survey, *Proceedings of the Seminar for Arabian Studies* 40, pp. 247-266.
- Newton, L.S., J. Zarins (2017) *Dhofar through the Ages. An Ecological, Archaeological and Historical Landscape*. Muscat.
- Orazi, R. (1997) *Project to restore the Monumental Complex of Khor Rori. Methods of analysis, consolidation and enjoyment*. Pisa.
- Pallecchi, P., A. Pavan (2011) Local raw materials used by craftsmen and in the development of the city of Sumhuram. In A. Avanzini (ed.), *Along the aroma and spice routes. The harbour of Sumhuram, its territory, and the trade between the Mediterranean, Arabia and India*, pp. 81-95. Pontedera.
- Pavan, A. (2017) *A Cosmopolitan City on the Arabian Coast. The Imported and Local Pottery from Khor Rori*. Khor Rori Report 3. Rome.
- Pavan, A. (2023) After the Fall of the Caravan Kingdoms Notes about the Occupation of Sumhuram and the Area of Khor Rori (Oman) from the Fifth Century to the Islamic Period, *Études et Travaux* 36, pp. 111-131.
- Pavan, A. (2024) Medieval Islamic Evidence along the Southern Coast of Oman: The Region of Ḥāsik, *Annali dell'Istituto Orientale di Napoli, Sezione Orientale* 84/1-2, pp. 120-133.
- Pavan, A., M. Degli Esposti (2016) *The urban shrine in Quarter A at Sumhuram* (Quaderni di Arabia Antica 4). Rome.
- Pavan, A., A.V. Sedov (2008) Religious architecture in Sumhuram: the *extra-muros* temple. In A. Avanzini (ed.), *A Port in Arabia between Rome and the Indian Ocean (3rd C. BC-5th C.AD)* (Khor Rori Report 2, Arabia Antica 5), pp. 261-272. Rome.
- Rougeulle, A. (2008) A Medieval entrepôt at Khor Rori? The study of the Islamic ceramics from Ḥamr al-Sharqiya. In A. Avanzini (ed.), *A Port in Arabia between Rome and the Indian Ocean (3rd C. BC-5th C.AD)*. Khor Rori Report 2, Arabia Antica 5, pp. 645-666. Rome.
- Zarins, J. (1997) Persia and Dhofar: Aspects of Iron Age Politics and Trade. In G.D. Young, M.V. Chavalas, R.E. Averbeck (eds), *Crossing Boundaries and Linking Horizons. Studies in Honor of Micheal C. Astour on his 80th Birthday*, pp. 615-689. Bethesda.

Zarins, J. (2001) *The Land of Incense. Archaeological Work in the Governorate of Dhofar, Sultanate of Oman, 1990-1995*. Muscat.

Zarins, J. (2007) Aspects of Recent Archaeological Work at al-Balīd (Zafār), Sultanate of Oman, *Proceedings of the Seminar for Arabian Studies* 37, pp. 309-324.