Larsa-'Uwaili Annual Report 2021-2022

Regis Vallet

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LARSA-'UWAILI ANNUAL REPORT 2021-2022

PRELIMINARY REPORT ON THE RESULTS OF THE XVITH & XVIITH CAMPAIGNS AT LARSA AND THE XTH CAMPAIGN AT TELL EL 'UWAILI

Régis VALLET
C.N.R.S. - Institut Français du Proche-Orient (I.F.P.O.)

Buildings B49 (forefront) and B48, from the south, and imprint of the seal of Etellum, great vizir of kings Gungunum and Abi-sare, found in room 1598 of building B49 (photo mission of Larsa and J. Lisein, 2021).

STATE BOARD OF ANTIQUITIES AND HERITAGE
REPUBLIC OF IRAQ

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Contents

Introduction
Regis Vallet.....5

I – Assessment of erosive and looting damages in Larsa
Mathilde Mura.....16

II – Larsa archaeological survey
Jessica Giraud.....21

III – The urban structure and hydraulic system of Larsa, crossed approaches
Regis Vallet, Lucie Cez and Lionel Darras.....34

IV – Trench 'PZ' across the Grand canal of Larsa
Melania Zingarello, Luc Bachelot and Mustafa Fadel Hsony.....79

V – The excavation of Building B50 in Larsa
Nadia Ait-Said, Matisse Vobaure and Regis Vallet.....87

VI – The excavation of Building B48 in Larsa
Pauline Jaccard.....100

VII – The residence of Etellum: excavation of Building B49 in Larsa
Antoine Jacquet and Tahir Kwin Anid.....113

VIII – Report on the 2nd millenium pottery of Larsa (all trenches)
Costanza Coppini.....121

IX – New epigraphic discoveries in Larsa
Dominique Charpin and Antoine Jacquet.....141

X – Building B33: an updated assessment of the state of preservation
Melania Zingarello.....149

XI – Tell el 'Uwaili 2021: Architecture and Stratigraphy
Johnny Samuele Baldi, Emmanuel Baudoin and Mohaned Mohamed Mnather.....152

XII – Report on the ceramic materials from Tell el 'Uwaili
Johnny Samuele Baldi.....161

XIII – Preliminary archaeobotanical results from Tell el 'Uwaili and Larsa
Carolyne Douché.....171

XIV – Photogrammetric surveing and mapping of Larsa and Tell el 'Uwaili
Jonathan Lisein.....180

Bibliographical references.....182

Appendix A – Museum List Fall 2021.....193

Appendix B – Museum List Spring 2022.....207

***Fig. 1** – Map of Thi Qar governorate showing the location of Larsa and Tell el 'Uwaili.*

INTRODUCTION

Régis Vallet

After a hiatus in 2020 due to the COVID-19 crisis, the French mission to Larsa (Tell es Senkereh) and Tell el 'Uwaili (Fig. 1) resumed fieldwork in the fall of 2021 for a 16th campaign at Larsa and a 10th campaign at 'Uwaili, which lasted one month, from November 2 to November 30, with the director arriving ten days earlier to set up mission housing in Nassiriya. The trenches were opened on November 3 and closed on November 25. The team assembled included, under the direction of Régis Vallet (CNRS-IFPO), 21 researchers and engineers from France, Iraq, the United Kingdom, Italy, Belgium and Germany, in alphabetic order: Nadia Ait-Said (British Academy fellow), Luc Bachelot (CNRS), Johnny Baldi (CNRS), Emmanuel Baudoin (University of Toulouse), Lucie Cez (University Paris IV Sorbonne), Dominique Charpin (Collège de France), Costanza Coppini (Freie Universität Berlin), Lionel Darras (CNRS), Carolyne Douché (MNHN), Pauline Jaccard (University of Bordeaux), Antoine Jacquet (Collège de France), Jonathan Lisein (Certus Visio), Mohaned Mohammed Mnather (SBAH), Mustafa Fadel Hsony (SBAH), Antony Reiff (ICAAR), Saya Halko Fattah (University of Erbil), Stéphanie Roussel (MNHN), Tahir Kwin Anid (SBAH), Matisse Vobauré (University of Montpelier 3) and Mélania Zingarello (University of Roma La Sapienza) (Fig. 2).

In addition, the mission hosted this year, for field training, during the last week of the season, a group of eight students from Dhi Qar University, led by their professors, our colleagues Prof. Makhled Diab Faisal, Prof. Ahmad Fadel Ajimi, Prof. Ali Rahim Abu al-Hail and Prof. Suleiman

Hussein Mahmoud. The logistics team was composed by Awad Abd-el-Hussein, Alwan Awad Abd Hussein and Ghalib Abdel Hussein (sites guards), Hamed Ghani Abed, Raad Abd-el-Nabi and Yasser Abed Khalaf (drivers), Mustafa Ghazi and Ahmad Daeim (cooks), Hessam Hassam Eissa (steward).

***Fig. 2** – Part of the 2021 Larsa-Uwaili team, from left to right: Luc Bachelot, Dominique Charpin, Nadia Ait-Said, Matisse Vobauré, Lucie Cez, Lionel Darras, Stéphanie Roussel, Pauline Jaccard, Régis Vallet, Emmanuel Baudoin, Carolyne Douché, Antoine Jacquet, Ménania Zingarello, Johnny Samuele Baldi, Antony Reiff, Costanza Coppini, Ahmad Daeim.*

We had the pleasure and honor to receive on November 15 the visit of our colleague Ali Obeid Shalgam (SBAH, Director of Excavations in Iraq), accompanied by an important delegation. Noting the extent of the excavations, Ali Obeid proposed that the SBAH close the site of Larsa, a proposal that we accepted with gratitude, especially after the mission had discovered tens of cuneiform tablets, a discovery likely to attract looters to the site, which Larsa has already suffered too much in the past. The technical documents (proposal for the layout of the fence) have been transmitted to the SBAH.

On November 17, the mission had the honor of receiving a visit from the French ambassador to Iraq, Mr. Eric Chevallier, accompanied by the cultural advisor Ms. Salwa Nacouzi and a small delegation. They visited the site and all the trenches, and were able to see the extent of the efforts made by the whole team to scientifically exploit a site as vast as Larsa.

The 17th campaign at Larsa lasted from February 6 to March 8, 2022. The team consisted of 14 French, Italian, Iranian and Iraqi archaeologists and engineers, in alphabetic order : Amanj Amin (SBAH-Slemani), Costanza Coppini (Freie Universität Berlin), Cassandra Furstos (Archaios), Naimeh Ghabaie (SBAH), Makarem Ghazzi (SBAH), Jessica Giraud (Archaios), Zahra Hashemi (ArScAn), Amaury Havé (Paris 1 university), Taher Ali Kaadem (SBAH), Haider Mohammed (SBAH), Rafat Munshaid (SBAH), Mathilde Mura (Archaios), Panida Pesonel (Archaios) and

Ghazauan Shaalan (SBAH). In addition, the mission trained seven people from the GIS and IT departements of SBAH-Baghdad, for one week. The logistics team consisted of Ivan Erhel (The Factory), Ghani Muhsen, Salem Shaheed (drivers) and Fouad Nahbar (cook).

As in 2019, the mission found a very warm welcome and was tremendously helped by all our Iraqi friends and colleagues. We would like to extend our warmest thanks to Dr. Laith Hussein (SBAH Director General), Ali Obeid Shalgam (SBAH Excavation Director) and Ms. Luma Joda (SBAH) in Baghdad, Amir Abdel Razzaq (SBAH Director in Dhi Qar) and Tahir Kwin Anid (SBAH, mission supervisor) in Nassiriya. Tahir Kwin Anid worked with us at the sites, as well as Mohaned Mohammed Mnather (SBAH) and Mustafa Fadel Hsony (SBAH). We would like to extend special thanks to Dr. Adil Alkenzawi, who continued to help us set up our accommodation in Nassiriya. We would also like to express our gratitude to the Cultural Service (SCAC) of the French Embassy in Baghdad (Ms. Salwa Nacouzi) and to the Department of Archaeology and Ancient History (DAHA) of the IFPO (Prof. Dominique Piéri), who support the project with specific funding (FSPI) provided by the French Ministry of Foreign Affairs (MEAE). We would like to thank them all, as well as the forty workers who joined us and without whom nothing would be possible.

The mission's scientific program continued the extensive work initiated in 2019 (Vallet et al. 2020, Vallet ed. 2020). Completion of the archaeological survey of the site and the audit of its surface. Continuation of the program on the urbanism and structure of the site and its surroundings, now associating geophysical and geoarchaeological surveys. Continuation of the excavation of trenches B48-49 and B50 at Larsa, of the trench on the early phases of the Ubaid at 'Uwaili, and of the program of paleobotanical studies on both sites. New this year is the opening of a third excavation trench at Larsa, "PZ" (for "Pont de la Ziggourat") to uncover a geophysical structure interpreted as the pier of a bridge (B69) spanning the Grand Canal near the Ziggurat. This is the first excavation operation directly resulting from the program on the urbanism of the site. Others should follow, on the large structures discovered. All the operations undertaken have achieved the objectives that were set for them.

The pedestrian archaeological survey of Larsa (J. Giraud and M. Mura), begun in June 2019, was finally completed in February 2022. The material collected has been processed and should make it possible to map the evolution of the site's occupation, but at the time of writing, these results are still being processed. The following report therefore focuses on the structures identified by the prospectors on the site and its surroundings. These observations confirm and complete, on many points, the geo-archaeological survey carried out in November 2021. As for the condition of the site surface, a total of 2298 looters' pits were counted, of which 1678 were verified in the field. Seven mechanized lootings were noted, which is relatively few compared to other large sites, trenches with a bucket of two meters wide (4m for that of the ziggurat). The looters' activity was concentrated on the northeast quarter of the site. It declined sharply after 2010 and has disappeared since the resumption of archaeological work. It should be noted that silting masks part of the information, silting that increased in 2022 whereas it had generally decreased in 2019-2021. Nevertheless, neither silting nor looting introduces any significant bias in the survey, given the colossal amount of material available.

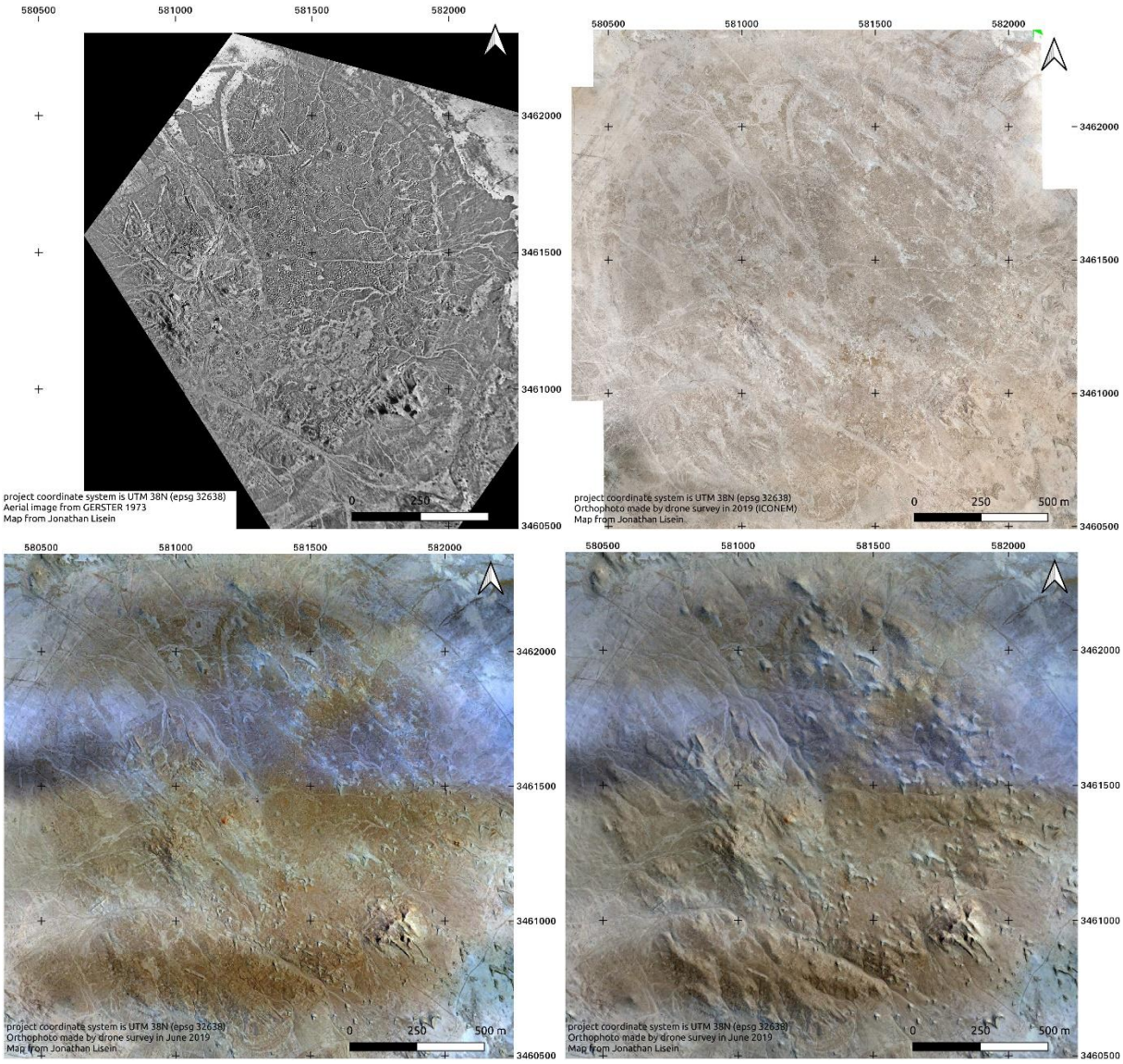

Fig. 3 *– Some of the images of Larsa used or produced by the mission. Top left: aerial view by G. Gerster (1973). Top right: ICONEM orthophoto (May 2019). Bottom left: orthophoto Jonathan Lisein (Certus Vision, Larsa Mission, November 2019). Bottom right: the same, shaded.*

The study of the structure of the site, of its urbanism, continued in the field in 2021, then in the laboratory, by crossing the geophysical (L. Darras) and archaeological (R. Vallet) approaches to which a geo-archaeological (L. Cez) approach was added this year. The work focused on the urban envelope (rampart) and the canal network, two fundamental elements of the urban space that maintain complex relationships affecting the organization of the city. Thus, the definition of their structure and interrelationships constitutes an essential initial step in the spatial study of the site. Data acquired during the 2019 and 2021 campaigns are considerable, consisting in high-resolution images of the site and its surroundings, i.e. geophysical image (covering now 36 ha), satellite imagery and ortho-photos (Fig. 3). The cross-analysis of this data and the observations on the field made it possible to establish the plan of the ramparts of the city and the hydraulic structures of the intramural and peri-urban network (Fig. 4), and to periodize its historical evolution. Although still incomplete, this network was based, in its final state, on several large canals up to 22m wide connected to basins of varying size, including an intramural reserve of 26,000 m^2 and numerous drainage channels, but also a port area (31,000 m^2) to the south of the city. In the surrounding plain, the network was densified to supply the city with water and to develop irrigation, a process that first affected mainly the western network, fed by the Euphrates and Iturungal rivers and

probably initiated by King Gungunum (1932-1906 B.C.). It culminates with the great works of King Sin-iddinam (1849-1843 B.C.), essentially in the east, fed by the Tigris river.

Fig. 4 – General Plan of Larsa (2022).

Our knowledge of the organization of the city of Larsa, including its monumental center, has made great strides since the recent resumption of field works. The progress of the last 2021 geomagnetic

prospecting campaign is an asset for future research since the signature of main urban structures is now known like that of the mudbrick city wall, gates and water-gates, bridges, streets, major canals as well as pipelines. This will allow us to study "à la carte" the urbanism and structure of a given sector. The hydraulic system still needs to be completed and studied in detail sector by sector. As it stands, it raises many questions about the concrete conditions of its operation and maintenance. The geoarchaeological study of the structures and specifically of their sedimentary filling should provide a new panel of data on these aspects.

Regarding the excavations, in the new "PZ" operation (M. Zingarello, L. Bachelot and M. F. Hsony) an initially square trench of 10 x 10m was opened around the supposed location of the structure sought (the east pier of bridge B69, fig. 4). Four levels of occupation have been recognized so far, numbered 1 to 4 from the top. Level 4 corresponds to that of the expected bridge pier (locus 4511), made of square baked bricks (33 x 33 x 8cm). It covers 4 x 3m but has only been partially cleared and its exact shape is not yet known. Installed in the filling layers of the canal bed, it has been excavated over an elevation of one meter (9 layers of bricks) without its base having been reached. We do not yet know the depth of the canal. Its top was strongly disturbed by ancient looting pits having torn off many bricks. A brick bearing an inscription of King Sin-iddinam (n°3, Frayne 1990: 160) was nevertheless still well in place at the top of the structure, dating it (at least its last reconstruction) and confirming that it was indeed a royal construction (Charpin and Jacquet, this volume). To the east of the trench, a strong north-south wall (1m wide), also made of baked bricks but rectangular (32 x 15 cm), probably corresponds to the retaining wall of the edge of the canal quay. The two structures, pier and quay, were associated by fill layers that, for the deepest ones reached, contained Old-Babylonian ceramic material. At the end of the Old-Babylonian period, in the course of the 17th century at the latest (C. Coppini), the large canals of Larsa, for lack of maintenance (probably since the abandonment of the city in 1738 B.C.), were completely filled in, to the point that it was possible to build over them. Indeed, the Isin-Larsa vestiges and Old-Babylonian layers were covered by Kassite-period levels, consisting of artisanal installations devoted to different steps of the making of pottery. Three main levels have been identified, with various installations (clay decantation basins, several drains, kilns, buried pipes), providing an opportunity to study a ceramic workshop of this still poorly known period.

In trench B50 (N. Ait-Said, M. Vobauré, R. Vallet), the aim was to continue the extensive clearing of the plan of the main Isin-Larsa/Old-Babylonian temple building and to complete, if possible, the excavation of its room 3019, preserved over a height of 4.5 m, up to the first floor (Vallet et al. 2020, Vallet ed. 2020). To the 625m^2 cleared in 2019, an additional 200m^2 were added in 2021 (Fig. 5). The façade of the temple could be followed (in tiers) to the northwest corner of the huge central courtyard (43m wide) of the complex, then a strip of side rooms appeared, and further on, the western façade of the complex, provided with a baked brick facing with niches and redans. Here, we uncovered the floors of the street that ran alongside the temple, and then, in a small sounding, its foundations. The floors of the temple were also reached in the side strip of rooms. The pottery and artefacts retrieved are very homogeneous and place the use of the building in the Isin-Larsa and the Old Babylonian periods (C. Coppini). In addition, a sand dune that masked the northern limit of the temple in 2019 has disappeared, so that the precise dimensions of the whole are now known: a rectangle of 127 x 61m, or 7250m². The temple itself, to the north of the main courtyard, measuring 61 x 45m, or 2745m².

Fig. 5 *- View of the trench B50 with the baked brick facade (3099) of the temple in the lower left foreground, room 3094 in the second foreground and the large front wall of the courtyard (3044) in the background.*

Fig. 6 *- B50: view of room 3019, from the northwest, at the end of the 2021 excavation campaign.*

At the top of the mound B50, the excavation of room 3019, due to the enormous mass of its filling, has not yet been able to reach the floors of the room (known only in the south-east corner). Nevertheless, it has gone deep enough for us to be sure that it is a blind room, with no access possible except through a wooden device from the upper floor (Fig. 6). Two large cavities in the north wall could be linked to the presence of such a device. It remains to be seen what the reason

for this particular arrangement was (possibly for the temple treasure). In any case, the filling of the room yielded ten bricks bearing inscriptions of King Sin-iddinam (n°3 and n°4, Frayne 1990: 160-161) commemorating his work in the Ebabbar (Charpin and Jacquet, this volume). The bricks come from the collapse of the first floor (the ground floor being intact) and their quantity leaves no doubt as to the identity of the builder of the building. Moreover, our work this year shows that the Ebabbar and B50 were neighbors, separated by only 35m of road space. According to our interpretation, this is most probably the Gipar of Larsa, where the *enum*-priestesses of Shamash resided. A Gipar at Larsa is attested since Gungunum (Charpin ip2). However, the building under excavation probably does not correspond to the original Gipar, that of Gungunum, but most certainly to a complete reconstruction of this one by Sin-iddinam, more than 70 years later[1].

The most unexpected results, in Larsa, were delivered by the large residences B48 and B49, north of B50. Our dating of the area proposed in 2019 must be partially revised in the light of the finds of this campaign. Only the recent temple of B50 (the one in baked bricks recovered from the Ebabbar, Vallet et al. 2020, Vallet ed. 2020) dates from the Hellenistic period, whose occupation extends well north of the Ebabbar but over a smaller area than previously thought. The district of the sumptuary residences further north (B48 and B49) is not Hellenistic, as suggested on the basis of a corpus that was much too small in 2019. In 2021, five rooms of the two buildings B48 and B49 were excavated down to the floors, while the plan of B49 was extensively cleared. All the material collected is of the Isin-Larsa period (C. Coppini), a dating fully confirmed by the numerous epigraphic discoveries from B49.

In B48 (P. Jaccard), a rectangular house of 682m^2 whose plan was fully recognized in 2019 (Vallet et al. 2020, Vallet ed. 2020), two of the three rooms excavated to date are kitchens. They yielded "ashy" soils rich in charcoal and organic matter (as well as a few small jars in situ) and were equipped with (burned) fired brick hearth bases (and probably with shelves whose post holes were found along the walls of room 1538). Each was located in one of the two sectors of the house (front and back) and associated with its larger room. Kitchen 1515, excavated in 2019, served large room 1517 (10.50 x 4.65m) at the rear of the dwelling, kitchen 1538 excavated this year, large room 1527 (10.80 x 3.15m) adjacent to the courtyard. The characteristics of this last room (location, size, wide front wall and tiled entrance) invite the interpretation that it was a reception room, where services were held. Its kitchen had an adjoining storeroom (1531), covered with a terracotta tile floor, in the southern corner of the house.

Near the opposite corner of building B48, the two graves of young children discovered in 2019 were also excavated. Grave 1574 belongs to building B48 (Level I), under the floors of room 1504 (washed away there by erosion but visible a little further south). Grave 1618 a little further north belongs to the underlying Level II, recognized in the whole sector under B48 and B49. The two tombs are similar, under a terracotta vat typical of the Isin-Larsa period, and contained very little funerary material.

[1] Without entering into a technical discussion, let us simply point out here that the building only yielded a (small) series of floors, at the very base of the walls, without any trace of reconstruction of any importance (neither in stratigraphy nor in the masonry). Moreover, the configuration of room 3019 implies that the floor (built by Sin-iddinam) was certainly original. Finally, the excavation showed that the construction of the building had been preceded by important earthworks, having levelled any previous construction.

To the south lies the building B49 (A. Jacquet and T. Kwin Anid). Extensive stripping of the building plan began in 2021. The building has been heavily damaged by several large pits and is crossed by a wadi, which has washed away a large part of it. However, enough remains, especially of its four facades, to know its extent, almost a square of 40 x 37m, i.e. 1480m^2. It even extends a little beyond this square envelope to the south-east, where the geophysics show that part of the eastern façade sticks out. In any case, it is a residence of exceptional dimensions and quality, provided with fired brick basements up to five rows of bricks wide (1.7m). Several rooms or courtyards are tiled with baked bricks and the use of bitumen coating in the rooms and on the thresholds is frequent. In spite of its fragmentary state and still partial clearing, the general economy of the plan is already discernible. The large, rectangular main courtyard is offset to the south-east, with the main rooms to the west and smaller, more private rooms to the north, including an archive room to the north-west (1598), accessible via a long corridor. The entrance, which has yet to be cleared, is probably on the opposite side of the building, to the south-east, where its facade juts out, facing the official buildings not far to the east.

Three rooms were excavated. Room 1578 in the northeast corner was excavated down to its foundations, with trenches dug in the massive mudbrick walls of the underlying Level II. More to the west, Room 1595 is a well-equipped bathroom, partially tiled, with a strongly concave bitumen floor pierced in its center by a drain (more than 5m deep, not dismantled). Finally, the adjoining room 1598 was also carefully excavated. As in the neighboring room 1595 and others not excavated (it is visible to the naked eye in some of them), a thick layer of collapsed and burnt material extended over the entire surface of the room. It contained a large quantity of ceramic sherds, animal bones and especially fragments of cuneiform tablets, very degraded. On the east side of the room, the fire layer rested on a tile floor. On the west side, on a clay floor that yielded the remains of burned furniture: a wooden chest, a reed basket and some ceramics in situ, which had certainly contained the tablets (Fig. 7).

***Fig.** 7 - B49. Left: Antoine Jacquet excavating room 1598, seen from the west. In the foreground, the wooden remains of the chest that must have contained the tablets. Right: a batch of freshly collected tablets.*

Fifty-nine tablets, tablet fragments and envelopes were found in the room, evidently thrown on the floor and deliberately destroyed before the building was burned down. The main character of the archive is Etellum, grand vizier (sukkalmah) of kings Gungunum (1932-1906 B.C.) and Abi-sare (1905-1895 B.C.) (D. Charpin and A. Jacquet). The seal of Etellum is found on many tablets and on the sealing of the archive chest. Other seals of family members are also present. The content of the texts concerns the administration of the private family estate and not governmental activities.

These discoveries make it possible to date the abandonment of the building to the end of Abi-sare's reign, since no tablets date from the reign of his successor Sumu-El. The violent destruction of the residence of the head of his predecessor's government sheds new light on the latter's rise to power, probably by force. A completely new part of Larsa's history in the late 20th and early 19th centuries is thus being revealed.

***Fig. 8** - General view of the trench at Tell el 'Uwaili, from the southwest (2021).*

At Tell el 'Uwaili (J. S. Baldi, E. Baudoin, M. M. Mnather), work in 2021 focused on the extensive clearance of the earliest occupation levels, Ubaid 0 and 1, to the west and north of the trench opened in 2019 (Fig. 8), extending earlier excavations to the north of the site (Vallet, Baldi et al. 2020). An area of nearly 600m^2 of the Ubaid 0 village has now been cleared (Level 5), the ruins of which have been reused for the placement of the potters' kilns of the Ubaid 1 workshops that follow (Level 4). About ten different constructions of all types, house, workshop, food ovens, granaries and other storage buidings, arranged in well-organised blocks neatly separated by alleys, begin to give an idea of the settlement layout, whose density increased over time (from level 5B to 5A).

For a long time it was believed that there was a long hiatus in the occupation of the site between the Ubaid 0 and 1 phases (Vallet 1996: 116, Forest 1996: 385), a reading that is no longer compatible with the numerous new data on the Ubaid 1 ceramic workshops of Level 4, whose interweaving with the last Ubaid 0 level shows their temporal proximity. This point is all the more interesting since the increasingly abundant quantity of movable material of all types collected, but especially the ceramics, demonstrate great differences, both technological and morpho-stylistic, between Ubaid 0 and 1, next to a finally quite reduced number of elements of continuity (J. S.

Baldi). The transition between the two periods, if there was one, does not resemble those that will follow, between the later phases of the Ubaid, but seems to have been the scene of cultural interactions, even inter-community, much more contrasted. The whole question of the origins of the Ubaid is thus posed on a new basis.

Finally, Caroline Douché has continued the program on the management, consumption and economy of plants on the two sites. Although the data collected at 'Uwaili are scarce, they remain fundamental for these very ancient periods, which are exceptionally well accessible on the site. Data is more abundant at Larsa (Fig. 9), for a period, the 2nd millennium, where texts certainly tell us a lot about agricultural practices, but which, as for other material categories, must be confronted with field data.

Fig. 9 *– Charred date stones (Phoenix dactylifera), recovered in the room 1598 of B49 at Larsa.*

I – Assessment of erosive and looting damages in Larsa

Mathilde Mura

***Fig. 1** - Eroded and looted landscape of Larsa.*

The Larsa intra-site survey conducted in June 2019 was an opportunity to initiate an unprecedented analysis of the state of the site after thirty years of absence (Vallet and al. 2020). It was carried out to better understand the extent of looting and erosion phenomena. As the latter could have an impact on future excavation work, it was necessary to undertake it during this first campaign. The analysis was continued during the 2022 campaign. The objective was twofold: (a) to understand the impacts of erosion and looting on the surface and the upper stratigraphic levels of the site; (b) to understand the biases associated with these two elements in the context of the survey.

Signature catalogue

Traditionally, the study of looting is carried out by remote sensing. In our study, we used two sources, a GeoEye image from December 2010 and a drone survey carried out in June 2019 by Jonathan Lisein. The typology used to describe the looting is that of M. Mura's thesis (Mura, 2021). This work reports 1841 visible pits in 2010 and 2298 visible pits in 2019. To complete this information and to compare the data collected in zenithal view, a ground count per surveyed square was performed. A total of 1678 depressions were detected on the site. Their description includes: (a) their quantity; (b) their attribution to a morphological type; (c) the spatial distribution observed per square.

Similarly, erosive phenomena (gullies, wadis, solifluction cones and dunes) were detected remotely on the one hand and recorded by surveyed squares on the other. The reading of the terrain highlighted the different types of cones, wadis and gullies. By remote sensing, 40 major wadis were traced, 546 main gullies were identified, 53 of which end in solifluction cones, and 252 dunes were

identified. This work still needs to be continued with the data collected during the 2022 campaign, particularly with regard to the formation of dunes, which are highly mobile and form rapidly in this geographical region (Fig.1).

Natural stigma

Concerning erosion, gullies, produced by a combination of chemical (water) and mechanical (wind) erosion, originate at the top of high features. The crack, which develops along the axis of the slope, drains sediment and possibly archaeological artefacts downwards. In some cases, a light cone of sediment, clearly identifiable in the drone images, interrupts the gullies. Where gullies are more numerous and interrupt at a channel, they amplify the depression in their path and thus produce the bed of the wadis that cross the site. Finally, the dunes adhere to small features in the landscape.

Around the site, nekbha are formed on bushy shrubs. On the site, the dunes are mainly of the barkhane type, concave in the wind. On the site, apart from the relief features associated with the vestiges, the main adherent features for the dunes are the depressions associated with looting (Fig.1). To the south of the ziggurat, an intensely looted area detected on the 2010 images is thus covered by the dunes in 2019. The looters have resumed their activities by moving westwards. Finally, more generally, all the pits associated with looting are silted up, producing a repeating pattern of brown sand-filled halo, which is very distinctive and visible on the imagery.

Anthropogenic stigma

The anthropogenic stigmas observed at Larsa correspond to four morphological types of looting: (a) DMnInd1: individual shallow manual depression; (b) DMnInd2: individual deep manual depression; (c) DMnFS: manual depression in a large pit, carried out by a group of individuals; (d) DMc: mechanical cut. No tunnel was detected.

The representation of the types decreases as the type becomes more invasive, with a large majority of DMnInd1 depressions (1046). The more invasive manual types -DMnInd2 (471) and DMnFS (154)- are concentrated in the areas to the north-east of the ziggurat and to a lesser extent to the south of the site (Fig. 2). One form stands out: looting carried out by room inside the buildings of square or rectangular shape instead of the traditional ovoid shape. Mechanised looting (DMc) is not very common at the site (only 7 occurrences). The most significant notch is the one made on the ziggurat with a 4m wide bucket. The other notches are smaller and are made with a 2m wide bucket, often over a distance of about 10m. However, DMc occurrences remain very isolated.

The three types of spatial distributions related to looting were identified at the site: (a) Isolated looting: one to three separated pits; (b) Targeted looting: more than three pits grouped together and carried out side by side; (c) Relentless looting: more than five grouped and overlapping pits.

Erosion of anthropogenic stigma

In addition, during the second campaign, which took place three years after the first one due to the COVID-19 pandemic, it was found that the level of silting of looting-related depressions had increased very rapidly. This explains, among other things, the lower number of depressions identified in the field compared to remote sensing analyses and underlines the importance of continuous monitoring of looting and on-site assessment whenever a return to the field is foreseen.

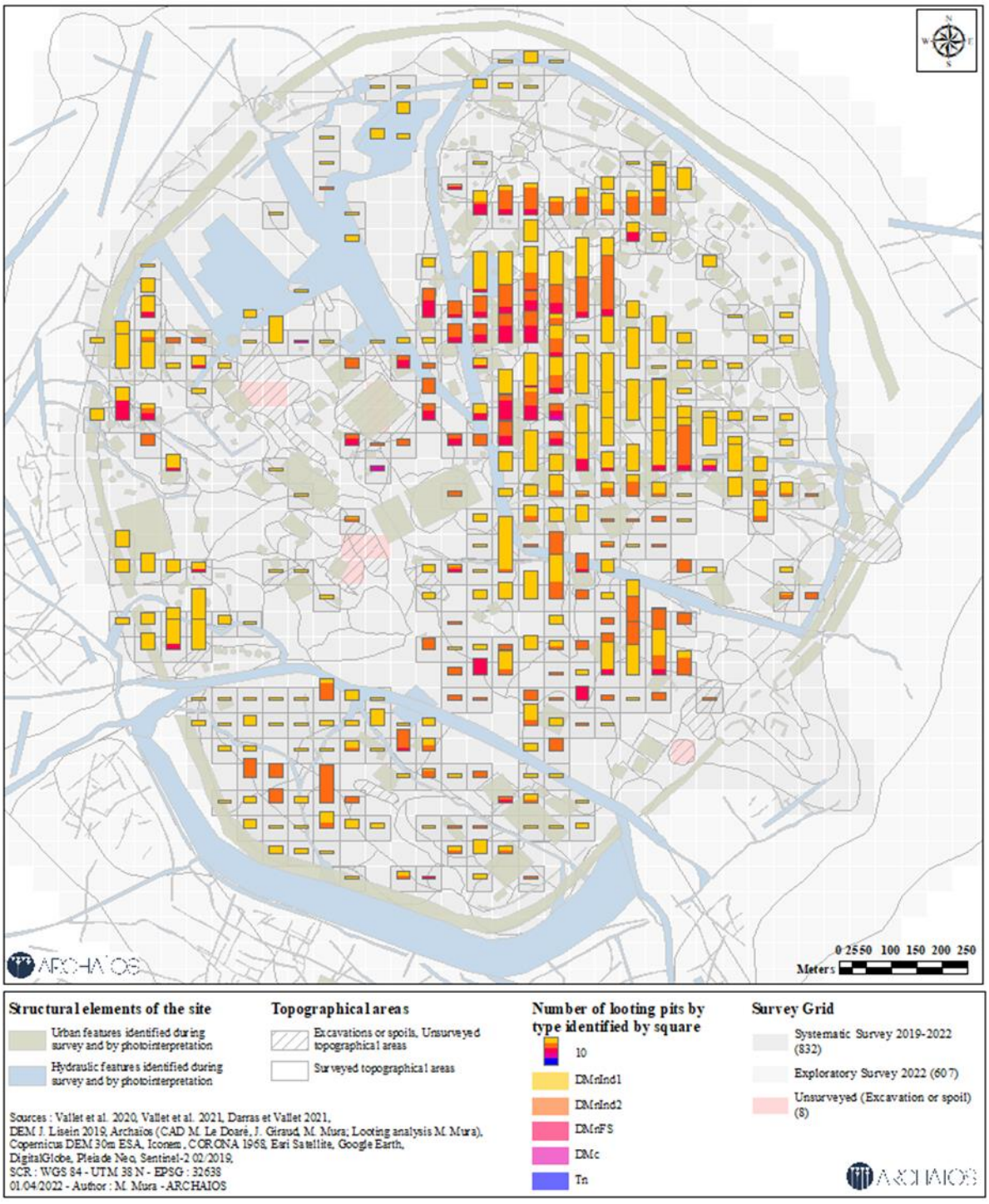

***Fig. 2** – Map of lootings identified on the site during the pedestrian survey in numbers per type and per square.*

Analysis of looting strategies

The field analysis allows for an in-depth study of the looters' strategy. At Larsa, it appears that the strategy consisted in targeting the visible elements in the elevation, which had not been excavated but had already been partly cleared by erosion. The north-western sector, comparatively, which has no visible structures on the surface, has been relatively spared. In the 2010 image, we can see effective, relentless looting concentrated on densely built-up areas (north-eastern sector of the elite housing). When targeted, it corresponds to a clearly identifiable and large building. Comparing looting before 2010 and between 2010 and 2019, there is a decrease in activity and a persistence of interest in the elite housing area (Fig.3). In addition, there is isolated looting appearing in areas previously left untouched (western edge of the site). The distribution shows unsuccessful looting

in the west and the discovery of new artefact-rich buildings in the east and south (identifiable due to a slight shift from the formerly looted areas to new ones located nearby).

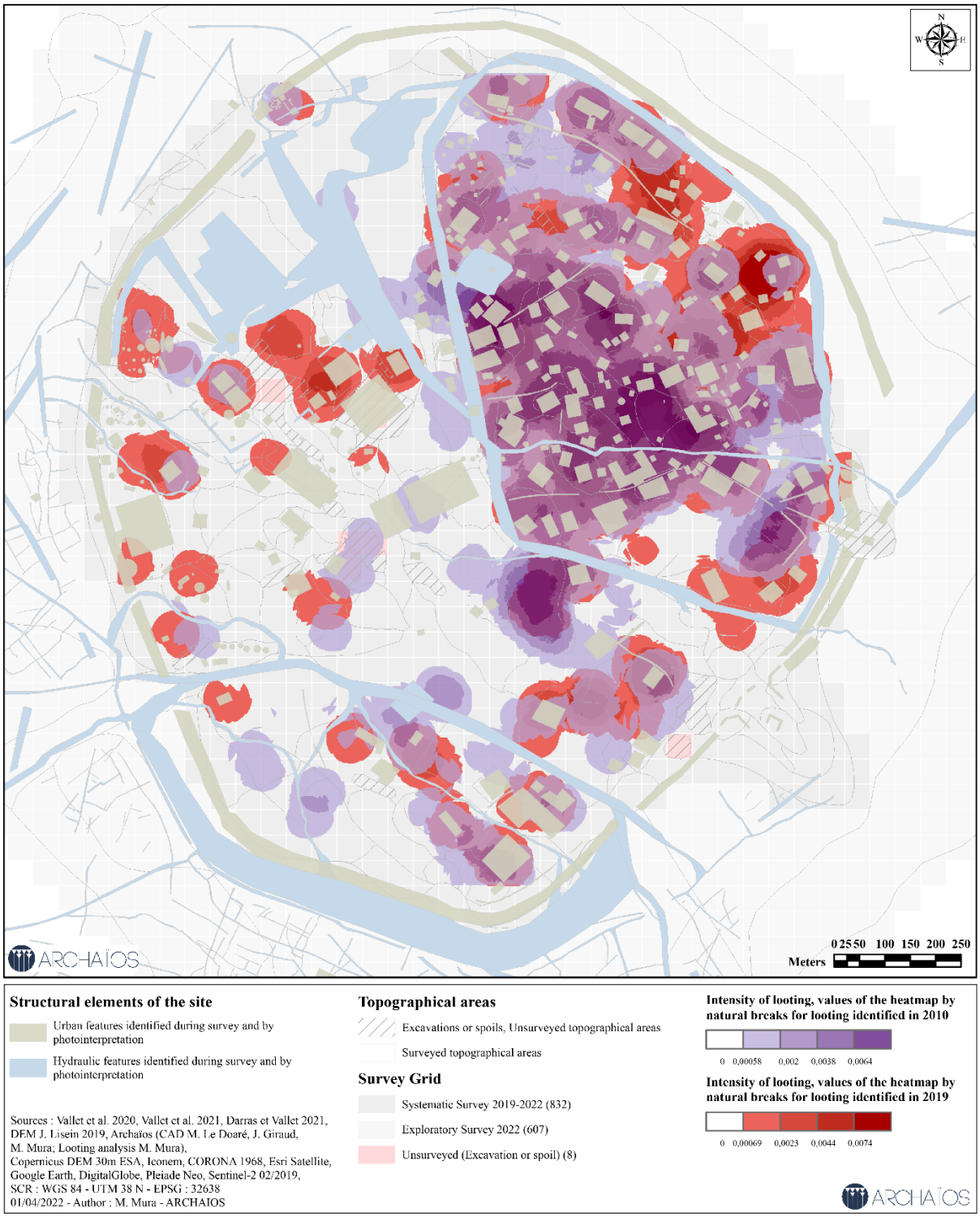

***Fig. 3** – Concentration map of looting identified by remote sensing in 2010 (purple) and 2019 (red).*

The ceramic material collected was dated during the two fieldwork campaigns and make it possible to map the occupation of the site by completing the dates known from the excavation. If we compare the map of the looted areas with the period identified at the site, we notice a predilection for the sectors dated from the Early Bronze to the Late Bronze Age (north-east), and a less dense looting in the sectors covered by the occupation of the Seleucid period, which is most of the site's western part. To the south, between the Grand Canal (now C3-C4) and the South Canal (C26) and below the South Canal, there is an intermediate concentration of looting in areas occupied in

the Neo-Babylonian, Seleucid, and Parthian periods. Moreover, where the material of the Parthian period is the densest, the depressions are deeper (DMnInd2). Two hypotheses therefore stand out: (a) the looters are interested in two sets of periods: primarily the Bronze Age, and alternatively the classical periods; (b) the looters are only interested in Bronze Age objects and have undertaken deeper excavations in the south of the site to reach the ancient levels.

By comparing the data collected at Larsa with those of two larger assemblages (Mura 2021 and Stone 2008), both hypotheses remain plausible. Indeed, from a set of 486 sites, it has been shown that the periods targeted by the looters are the Early Bronze Age, the Late Bronze Age/Iron Age transition, and the Hellenistic/Parthian periods (Mura 2021). This confirmed E. Stone's observations in southern Iraq where she distinguished three categories of targets: Akkadian cylinder seals, Ur III and Old-Babylonian tablets and Parthian/Sassanid coins (Stone 2008). Confirmation of these observations and preferred periods on a sample of sites from Syria, Iraq and Afghanistan allowed the definition of a perennial trend across a wide geographical area, in which Larsa fits perfectly.

The types of objects extracted and targeted, considering the elements discovered during the excavations and surveys, can be diverse and are present in large quantities:
(a) Miniature elements (zoomorphic figurine, chariot, boat, piece of furniture), discovered in large quantities throughout the site during the survey;
(b) Cylinder seals (two found during the survey, in unlooted sectors);
(c) Cuneiform tablets, the presence of which is attested by the excavations, but of which fragments are only rarely found during the survey (a single fragmentary inscribed cylinder);
(d) Votive plates, the presence of which is attested by excavations and survey in unlooted sectors;
(e) Coins, the absence of which in survey work could indicate their systematic looting;
(f) Or on a smaller scale, beads (made of carnelian or shell), other items of jewelry (metal rings), arrowheads etc.

All these small objects are highly susceptible to trafficking because of their size, which makes them easy to conceal and remove from the country, their presence over a wide geographical area, making it easier to falsify authentication documents, and their volatile economic value.

Damage and possible bias

The case study of Larsa finally allows us to emphasize that looting (unlike erosion) does not seem to produce a bias in terms of the volume of diagnostic ceramics or objects collected (with the possible exception of coins). While a greater amount of material was expected on the surface in areas targeted by looters, the distribution maps produced during the survey show a lower density of diagnostic ceramics kept in the looted areas, but neither a lower nor a higher density of sherds collected in general. The size of the characteristic assemblages therefore does not seem to be directly correlated with the clandestine excavations. This can be explained by the limited interest of looters in fragmentary ceramics. Only complete pottery may be taken by clandestine excavators, who leave a sufficiently large assemblage for scientific survey. Similarly, the rudimentary nature of clandestine excavations produces a regular pattern of spoil left near the looting holes. The material is therefore relatively little displaced on the site.

On the other hand, a superposition of the map of erosive stigmata with the survey maps allows us to explain certain high concentrations of material (at the bottom of the slope) or, conversely, small quantities of artefacts located in the buildings. The buildings, forming secondary mounds within the site, were emptied by looters who abandoned their rubble on the slope. Mechanical (wind) and chemical (water) erosion forms gullies which then alter the sides of the secondary mounds and drain the archaeological material down the slope. Low concentrations are thus observed at the top of the mounds, corresponding to the location of former buildings, and abnormally high concentrations at the bottom of the slope. The identification of this bias makes it possible to consider dating the buildings by analyzing the material collected at the bottom of the adjacent slopes. The dunes, on the other hand, produce a bias, with lower concentrations of material at their location, which are not compensated for in the surrounding area (Fig.1). Their mapping is therefore particularly important to justify unusually low densities in otherwise heavily occupied areas.

The erosion or deliberate damage of an archaeological site does not necessarily prevent new surface investigations from being carried out, provided that the biases are identified, known, and analyzed on a case-by-case basis. The biases identified at Larsa show a low impact on the scientific results of the survey, which can easily be weighted according to the areas surveyed and the degree of damage or covering that they have suffered. Nevertheless, the looting at Larsa has a significant impact on the first stratigraphic levels through which it occurred.

II – LARSA ARCHAEOLOGICAL SURVEY

Jessica Giraud

As Archaios did not authorize the public release of its contribution,

we regret to have to remove it from the public version of our report.

We apologize to our readers.

III – The urban structure and hydraulic system of Larsa, crossed approaches

Régis Vallet, Lucie Cez and Lionel Darras

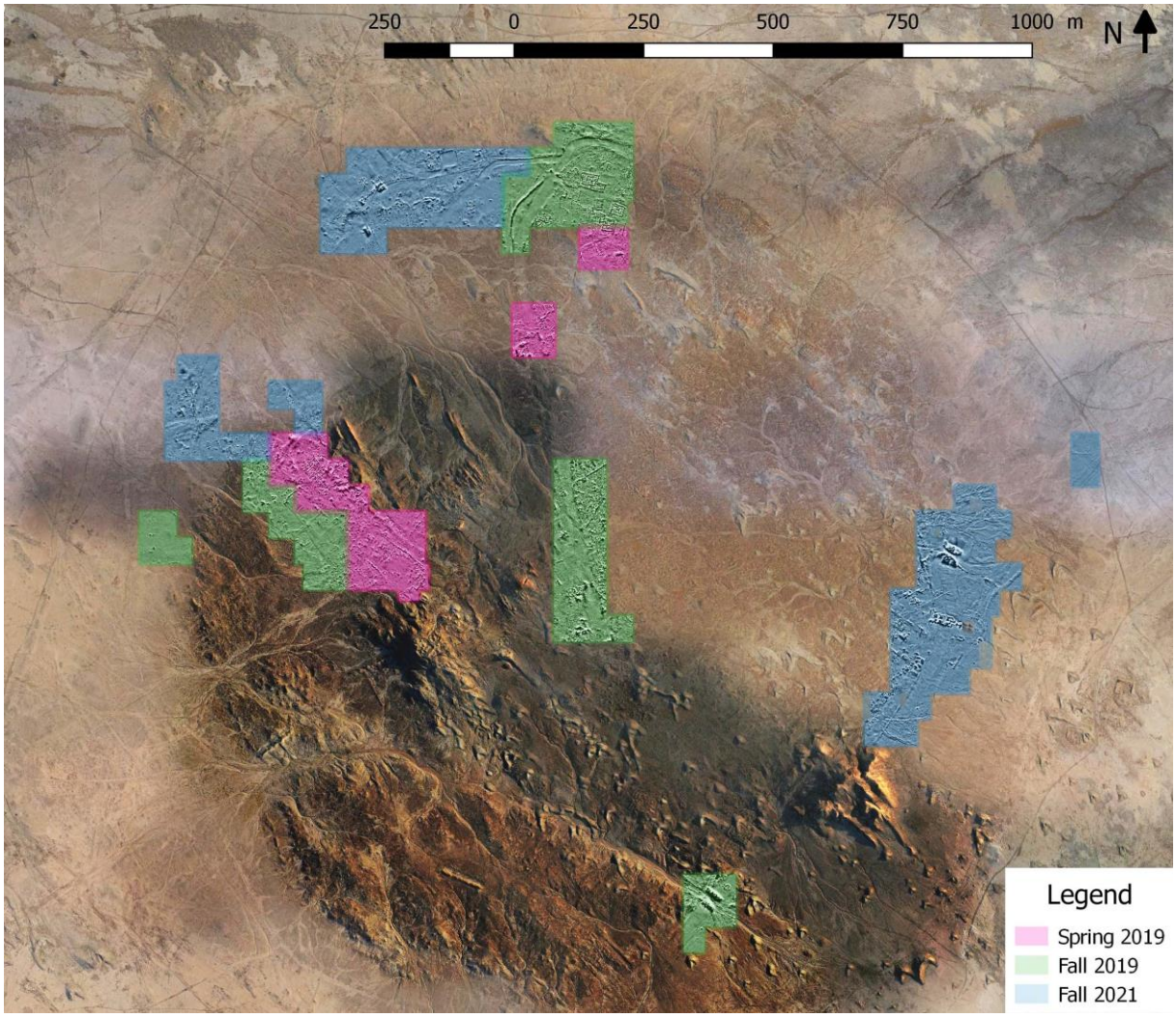

***Fig. 1** – General plan of the geomagnetic prospecting and evolution by campaigns.*

In 2021, the study of the structure of the site, of its urbanism, continued in the field, then in the laboratory, by crossing the geophysical (LD) and archaeological (RV) approaches to which a geo-archaeological (LC) approach was added this year. The work focused on the urban envelope (rampart) and the canal network, two fundamental elements of the urban space that maintain complex relationships affecting the organization of the city. Thus, the definition of their structure and interrelationships constitutes an essential initial step in the spatial study of the site.

The geophysical method used in these campaigns is magnetic prospecting which is a fast and effective method for a first approach on an archaeological site. The principle of the magnetic method is to measure local variations in the Earth's magnetic field due to the presence of iron oxides in soil and archaeological structures (Aspinall, Gaffney and Schmidt 2008). Magnetic prospection was conducted with a G858 caesium vapour gradiometer (Geometrics Inc) on an 18ha area, in addition to the 18ha of 2019 (Fig. 1), distributed with areas of 50 x 50m and a survey following profiles spaced 1m apart and measurements every 10cm along the profiles. The measurements were interpolated to 50cm. Three sectors were selected for the 2021 campaign. To the east, a new sector

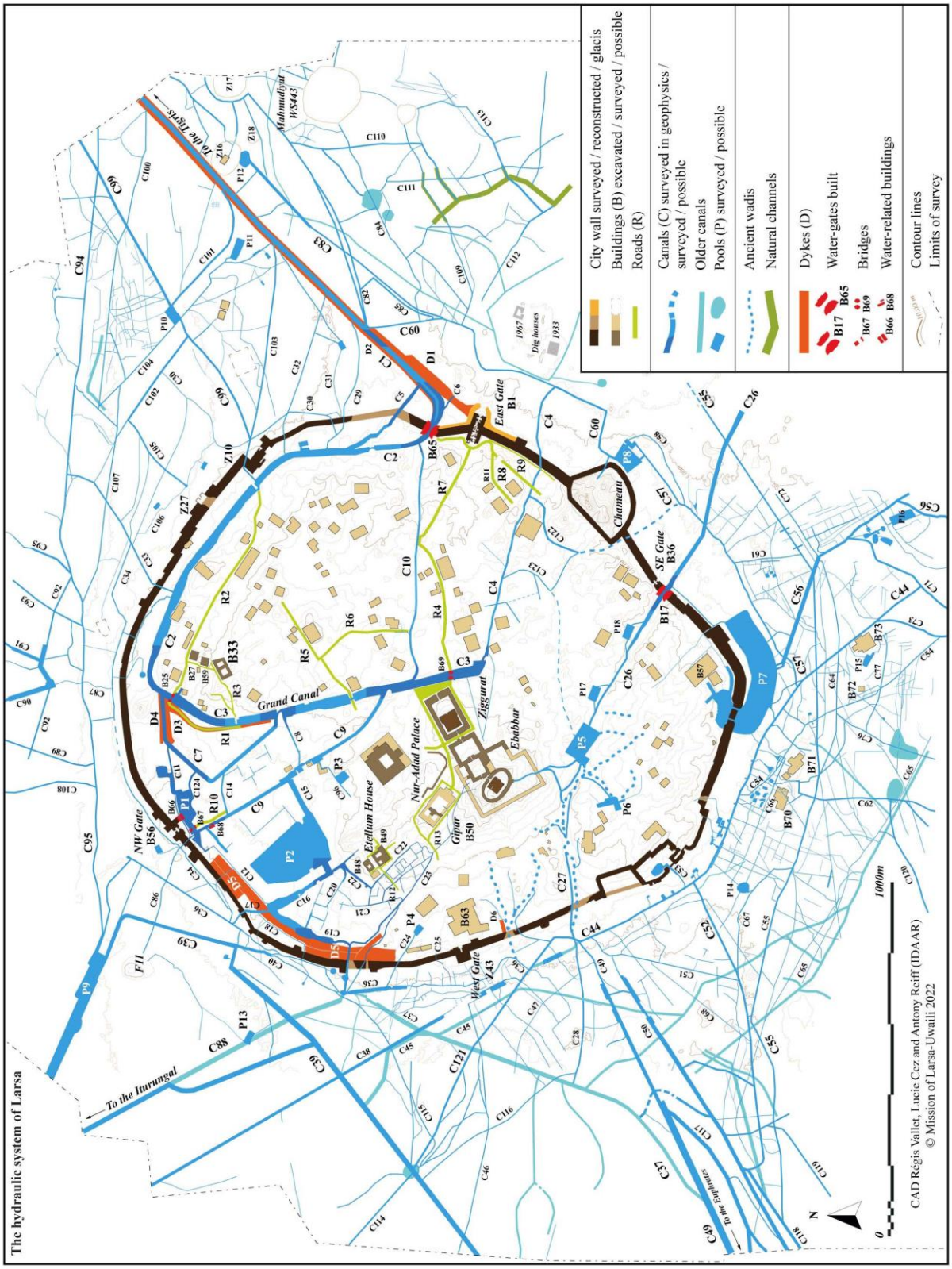

***Fig. 2** – The hydraulic system of Larsa.*

on either side of the eastern city gate, known as the "Parrot" gate, was opened. Its objective was to clarify the relationship of the gate to the rampart, which had not been established since 1933, and to define the route and magnetic signature of the city wall and of important canals, discovered in 2019 in this sector and probably crossing the rampart. To the north, the sector opened in 2019 was extended to the northwest gate. Finally, to the west, the prospecting begun around buildings B50 and B48-49 was extended to the northwest as far as the city wall, already attested in geophysics a little further to the southwest, but this difficult sector does not yet present a unified geophysical image.

The data provided in the frame of the 2019 and 2021 campaigns consists of ortho-photos taken by drone – from a UAV flight by ICONEM in May 2019 and Mavic Air 2 pro drone processed by J. Lisein in June 2019 and November 2019 and 2021 – covering the site and the surrounding plain (Lisein and Suire 2020) and geophysical image from the magnetic survey carried out by L. Darras (Darras 2020). A first sketch of the city's hydraulic network (Vallet 2020, fig. 5; Darras 2020: 27-31 and fig. 11) have been established from this high-resolution spatial documentation, georeferenced and integrated on a GIS (Lisein and Suire 2020: 16). This first map integrated major central and peripheral structures known since 1984 thanks to aerial photographs of G. Gerster, but whose interpretation has sometimes diverged (see Huot, Rougeulle and Suire 1989: 20, 22, 34-35 and fig. 9b; Margueron 2013, fig. 111: 129). It also incorporated new elements such as connecting canals to the Grand Canal and a draft of the hydraulic network to the south of the Tell[1]. In the continuity of these first analyses, the geoarchaeological investigations implemented from 2021 aim to reconstruct the ancient hydraulic system in and out of the city, its connection to the major canals of the lower plain of the Euphrates River and to date its operating time. In this goal, a carto-photo-interpretation work of the available imagery was initially carried out, to which is added the proofreading of the aerial photographs from G. Gerster dated from 1973, and systematic observations in the field. The plan of the ancient hydraulic system of Larsa (Fig. 2), if it remains incomplete for some areas, provides a detailed picture of a complex network based on a large number of canals/pipelines and basins. We detail below the results obtained for the different sectors of the city.

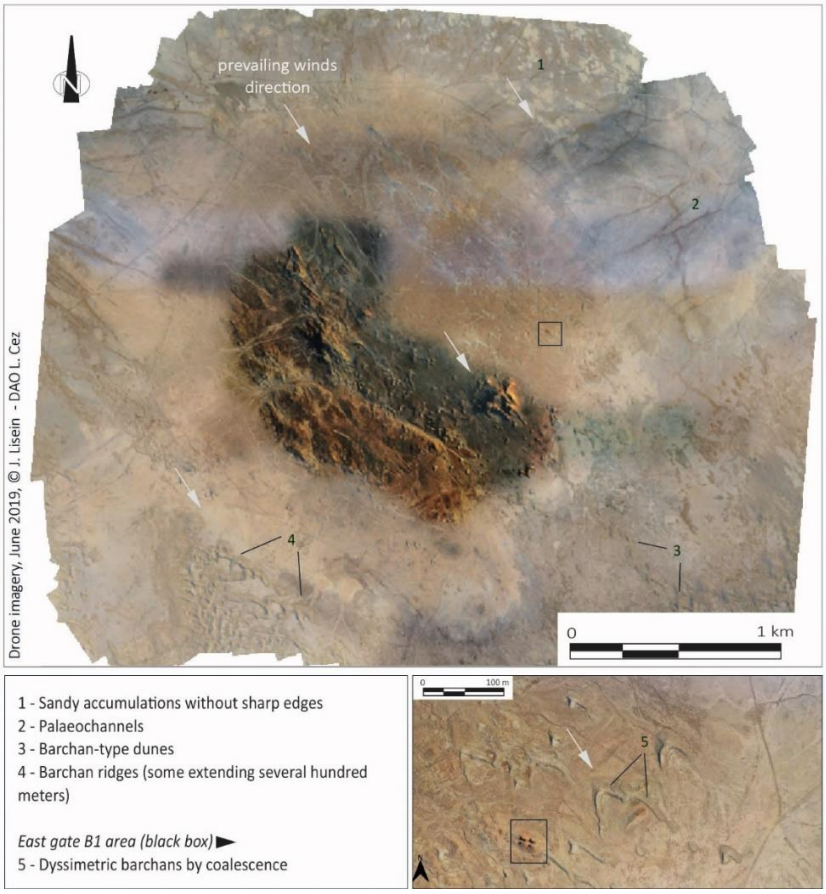

***Fig. 3** – Aeolian process in the study area of Larsa.*

[1] To be complete on this brief historical reminder, we will add that Archaios has mapped as of 2019 the surface aspect (altered by various erosive phenomena) of five structures (hereafter canals C9, 15, 16, 19 and basin P2, cf. Vallet et al. 2020: 165, fig. 11) for which we were waiting to have enough elements (geophysical in particular) in order to restitute the precise ancient layout (cf. Vallet et al. 2020: 134).

1. The East Sector

The deflation exerted by north-west/south-east prevailing winds leads to the removal of the bare and dry surfaces of the floodplain of the Euphrates River, facilitated by its flat topography. The stripping of superficial loose materials made visible a large number of archaeological structures of varying extensions such as canals, dykes and basins and palaeochannels (Fig. 3). These sandy accumulations can be observed in the plain and on the site of Larsa itself because the eminence of the Tell is an obstacle in the path of winds and causes the trapping of particles[1]. The eastern half of the urban territory of the site is heavily silted up with mainly sands toppings and barchan-type dunes[2], sometimes coalescent[3], which are present in the plain to the north and the south (Fig. 3). In the northeast, the greatest density of looting pits and the many ground depressions that this causes (Mura 2020: 19, and this volume) promotes greater silting of this sector. More or less mobile in time and of varying spatial extension, sandy accumulations prevent the recognition of the fossil traces of hydraulic structures. Due to their unequal visibility, the plan of the ancient hydraulic system that we present here for the east sector (infra, Fig. 5) shows areas of lesser density or even without canals. The geophysical image is of great interest in this case.

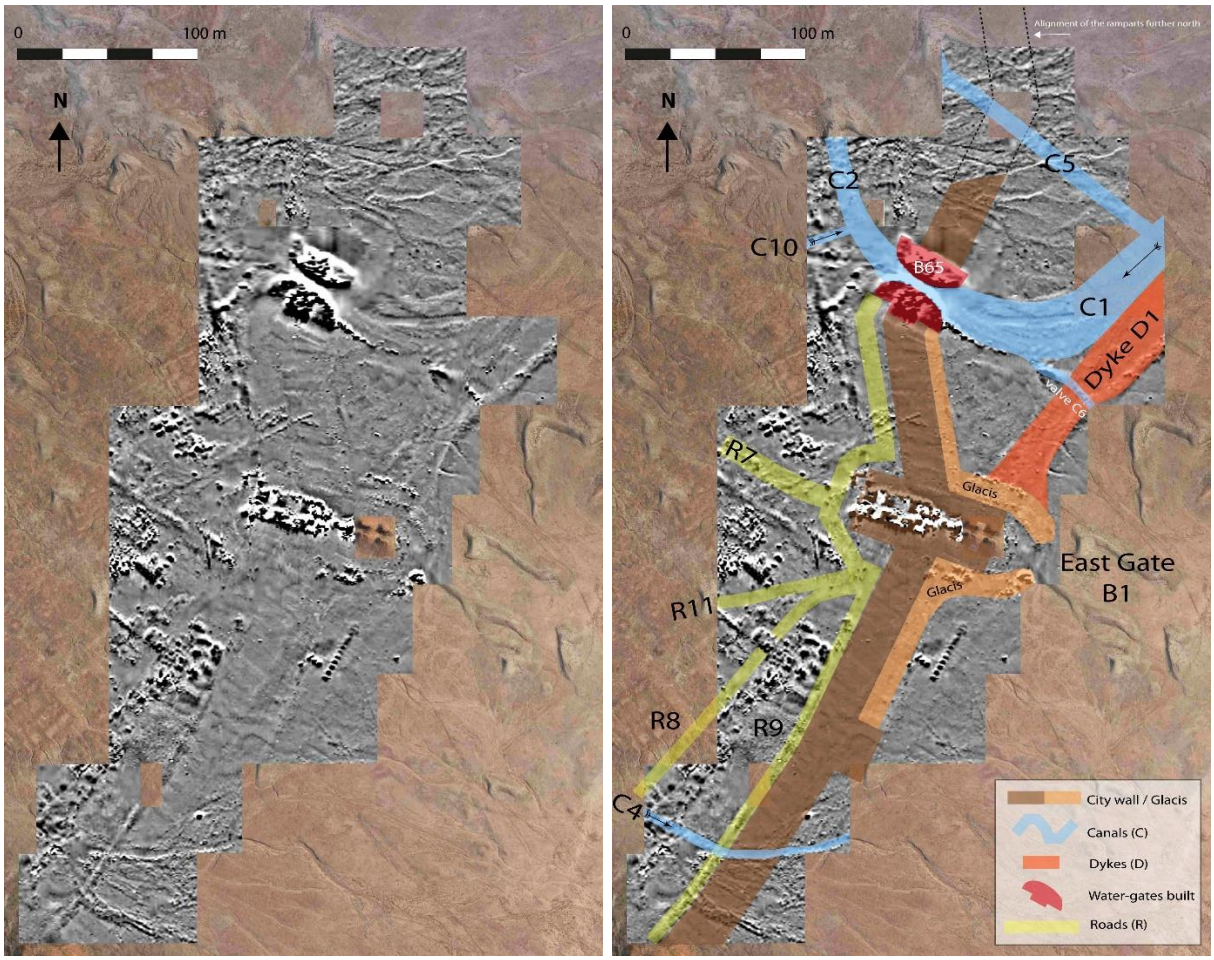

***Fig. 4** – The East Sector: raw plan and interpreted plan from the geomagnetic image.*

[1] This explains its darker shade compared to the surrounding plain in drone imagery.

[2] Crescent dunes with convex-shape facing the wind.

[3] Coalescent barchans are being formed in the north-eastern part of the site, attested by their dissymmetric shape linked to the elongation of one of the horns of the dune.

Geophysical main results (L. Darras and R. Vallet)

Until now, geophysical prospecting in the eastern part of the site had remained limited to the southeastern end of the so-called "southern channel"(see Darras 2020: 23, fig. 1). This year, the magnetic prospection of 8 hectares has been realized on both sides of the East gate (Fig. 4), on an area of a dimension close to 500m by 300m. The magnetic map shows well the city wall across almost the entire area. The magnetic signature of the rampart is very homogeneous, with striations characteristic of large mud brick masonry. To the north, it disappears, entirely washed away by modern wadis coming down from the Tell further west. To the south, it is crossed at an angle by the canal (now numbered C4, see infra) coming from the Grand Canal (C3). Moreover, the magnetic map revealed two important baked brick structures associated to the city wall. First, in the center of the sector, an imposing elongated construction allows us to understand that the structures excavated in 1933 are only the external part of the city gate. The fired brick construction visible is fully embedded within the mud brick of the city wall, i.e. the fired bricks constitute the facing of the walls of the internal rooms of the city gate (as is also the case for the external part excavated in 1933). The East gate thus appears to be a massive structure of 80 x 35m (at minimum), with several rooms controlling a central corridor. Secondly, more to the north, at the intersection of a canal coming from the east (C1) and the city wall, major magnetic anomalies reveal the presence of two semi-circular massive structures leaning against each other, leaving a 5m wide passage between them, obviously intended to channel the flow of the canal at its point of entry into the city (infra). The structure covers a total area of about 40 x 40m, and its similarity with the so-called "bridge" of Tello is obvious (curved facades, powerful perpendicular partition walls). Here, however, it can be seen that it is by no means a bridge, but a base supporting the rampart, to allow a large canal to pass under it.

Discussion (R. Vallet and L. Cez)

The East Gate B1 or 'Parrot Gate'

The magnetic prospecting has enabled precise location of the Parrot Gate (east Gate B1 on our plan), a question that has remained unresolved since 1933. The layout of the rampart is clear, more on its western, internal face, where streets border it, than on the outside, due to various erosive phenomena (infra). The curtain wall has a width of 20m but several pieces of equipment widen the wall, which is the case of the gate itself. The limits of the brick masonry have been determined thanks to the geophysical image and the analysis of the ortho-photos. The structure as a whole is made up of about ten rooms distributed on either side of a long central passage, generally less than 4m. Among them, transverse guardrooms are located at each end and two small "corridors" (one of which opens directly to the outside, to the west) probably corresponded to staircases[1]. They were to allow quick access to the top of this structure, the elevation of which must certainly have been considerable, for defensive reasons. The summit platform offered a strategic firing position, especially since the available space of around 2800m^2 could easily accommodate a battery of war engines. The 80m long passage laid out in the center of this massive work had to be ventilated but also lit by large skylights, probably two in number, one of which could be located at the level of the

[1] Elements of the western part of the gate, numbered B2 (Huot, Rougeulle and Suire 1989: 48) recognized on the surface in the 1980s, belonged to this same construction.

angle of the internal passage. On the side of the city, the entrance to the door seems off-centered to the south, while a small adventitious room was to make it possible to monitor access. The projection of the gate into the interior of the city explains why the R7 Street did not seem to extend as far as the gate, when it was thought to be reduced to its eastern part. But Street R7 does serve the gate and leads to downtown. Before the gate, the R7 Street is joined by the R11 Street, which forms almost a semicircle around this western entrance. To the south, two other streets start from R11: R9 runs along the rampart, R8 (obstructed by the encroachment of a house) extending to the south beyond C4 and R11 itself, firstly oriented westward before forming an elbow southward and along several buildings in the C4 canal direction. R8 and R9 streets were provided with water pipes evacuating through the rampart (not shown on the plan). To the north, the R11 road runs along the rampart to join the B65 Water-gate.

Other works completed the defence of the eastern gate. First, there are built-up alignments, some of which include fired brick elements, along the outer face of the rampart and following the contours of the gate. It extends to the front of the gate, which was accessible through an opening in this reinforcing structure. To the north, the construction protected the rampart up to Water-gate B65. To the south, the construction is more massive and runs along the rampart until what can be interpreted as a bastion, from which the ground appears much eroded. Based on its physical relationship with the southern dyke of canal C1, these are certainly traces of a glacis. The end of the dyke flares out to merge with it, which tends to prove that the two had an equivalent elevation at the level of the forecourt of the gate where they meet[1]. We also know that the gate, a little further east, was raised a few meters above the plain below (Suire 1989: 38). Other elements must have existed but whose traces are not very clear on the imagery to be able to restore them with precision without excavations[2].

In view of all these elements, it is obvious that the Parrot Gate was a defensive fort of primary importance for the city, where a small troop was certainly stationed permanently to monitor and protect its access. What was the raison d'être of these defensive devices in this part of the city? The answer to this question was provided by the analysis of the geophysical image and the ortho-photos: the main water supply of the city has been identified just northeast of the Parrot Gate.

The canal C1

The canal C1 (Fig. 5) is a major work supplying the city with water from the northeast. It is already known by the extensive archaeological prospection of Adams and Nissen (1972: 36-39) and by the recent palaeohydrological investigations of Pournelle (2003: 181, fig. 76), who highlighted its layout from the Tigris to Bad Tibira (17 km northeast of Larsa) and dated it to Old Babylonian period. Historical data establish that this canal allowed the supply of water to the city from the reign of Sin-iddinam (1849-1843 B.C.) (Sigrist 1990: 24, Frayne 1990: 158-160, Steinkeller 2001). This canal possibly replaced an older structure since Adams found archaeological artefacts dated to the Ur III period (2112-2004 B.C.) on a part of its course (Adams and Nissen1972: 39).

[1] The glacis has already been seen by A. Parrot (1933: 177, who specifies in rammed earth), but which also very certainly includes under the same label the raw brick masonry of the gate itself, dismantled without being seen (except the late plugging in the passage, infra).

[2] We point out in particular two large perpendicular walls in baked bricks, to the south of the gate, could have delimited a small basin, because a pipe crosses the rampart at this place, which seems to have left dark traces of flow.

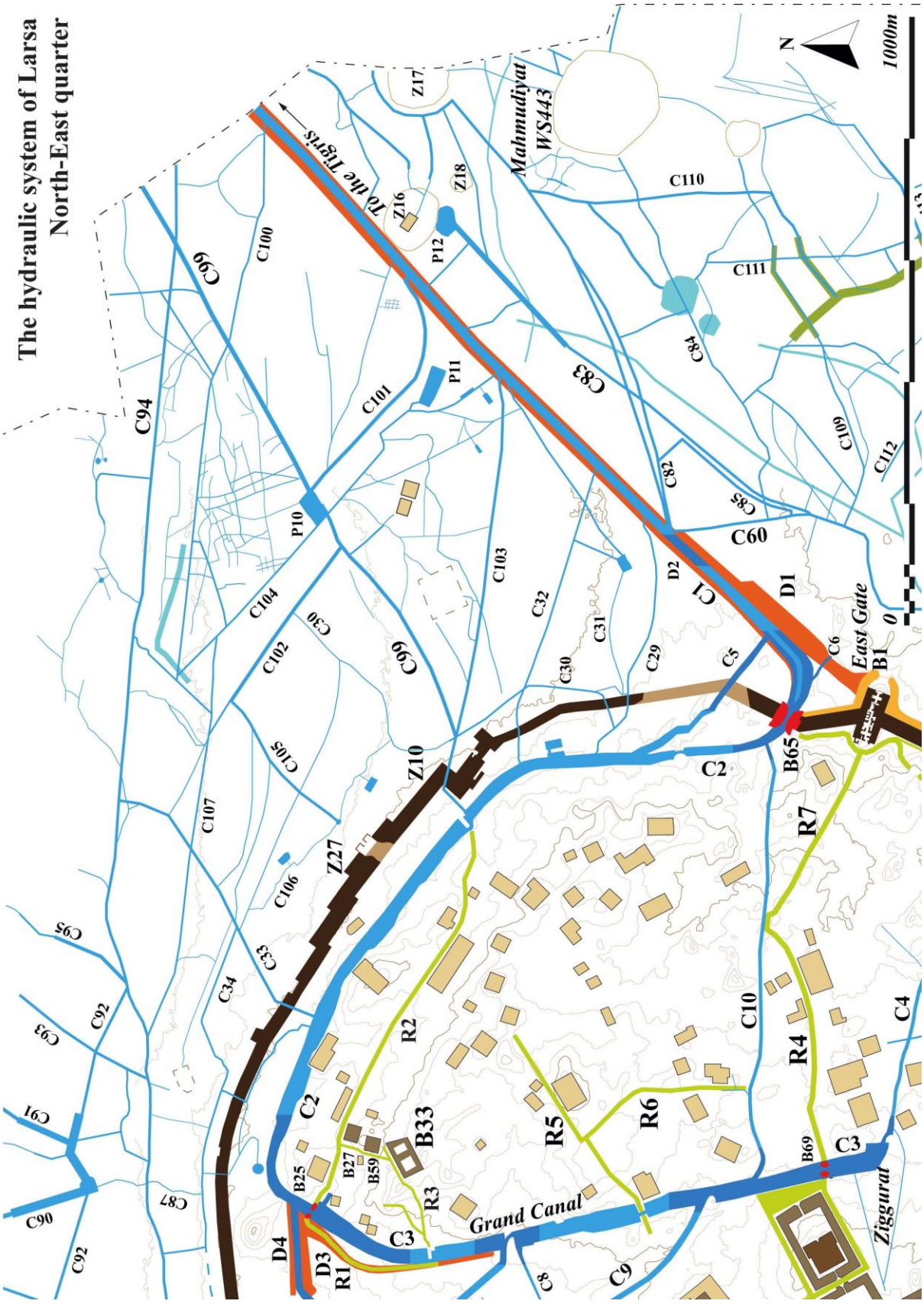

Fig. 5 – Detailed plan of the hydraulic system of Larsa: North-East quarter.

It is a large and rectilinear canal whose trace is very clear on satellite imagery and aerial coverage by drone where it can be followed for about 1.2 km distance from Larsa (Fig. 6A). Our study determined its connection to the city, its entry point being located about 100m north of the Parrot Gate (East Gate B1), 85m to the nearest of the gate. A large template of usually several tens of meters large first characterizes this canal. Measured approximately 500m northeast of the Parrot Gate, on a portion where the canal's layout is very clear in the plain, the total width is approximately

30m (Fig. 6B). We notice that the width of the structure increases towards the northeast. Two massive dykes frame the canal on its southern (D1) and northern side (D2), 5 to 6m wide each reaching about fifteen meters further north.

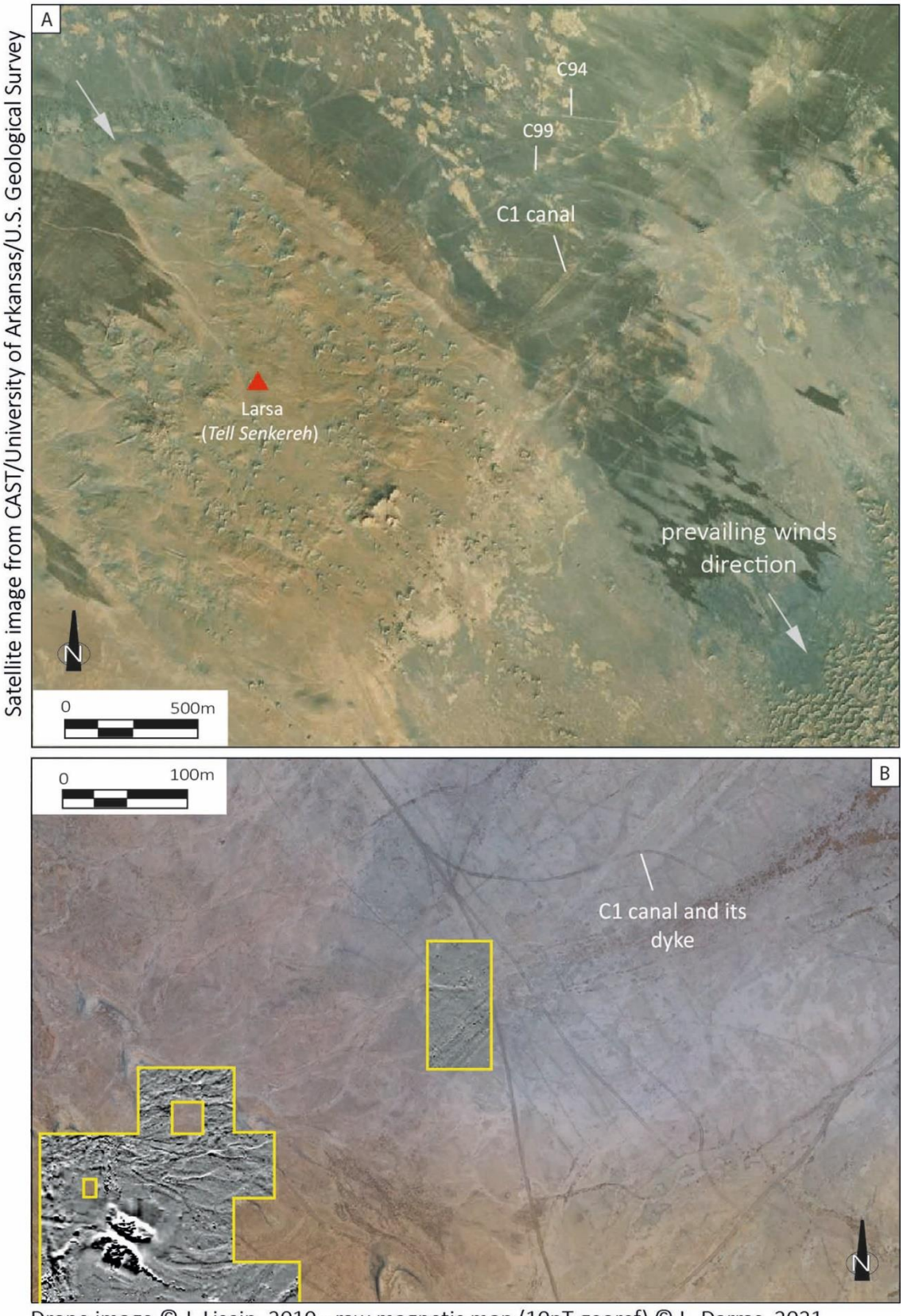

***Fig. 6** – The canal C1 on satellite imagery (A), the ortho-photo by drone and geophysical image (B).*

As it gets closer to the city, the width of the canal decreases and the dykes become more imposing. These new technical characteristics aim to regulate the kinetic energy of the flows prior to crossing the Water-gate B65. At the same time, the southern dyke of the canal (D1) widens about 150m

before it reaches the East gate. It can be seen that the southern dike (D1) consists of several elements. To the west, on the canal side, a wide dark strip (13m wide), probably made of earth; to the east, on the plain side, a retaining wall (7 to 8m wide) punctually reinforced with baked bricks; and in between, an earth filling. It is possible that the last two elements are late additions, i.e. that the dike was reinforced (doubling its width to 27m)[1].

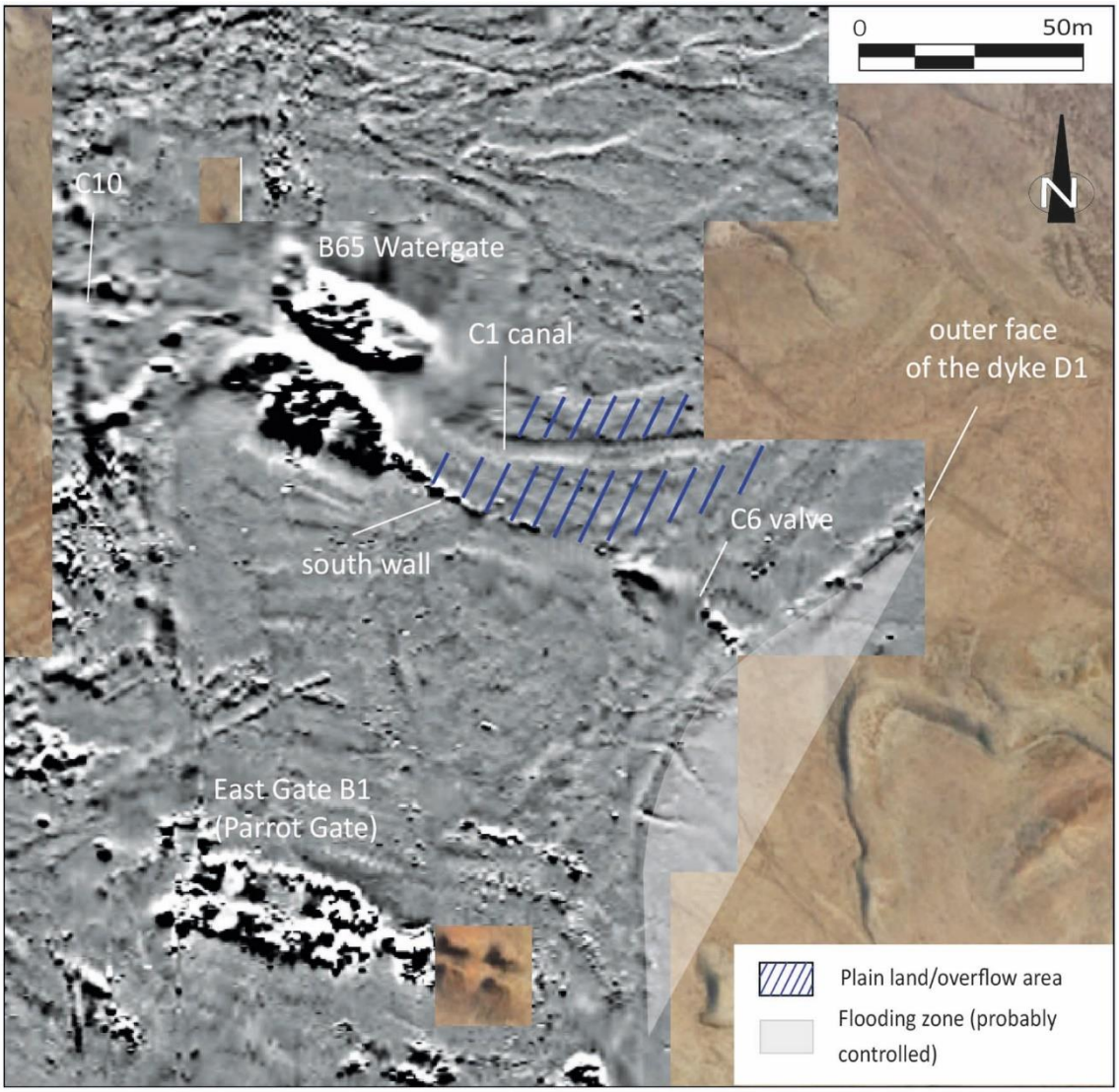

***Fig.** 7 – The canal C1 at its crossing point of the Water-gate B65 from the geomagnetic image.*

The B65 East Water-gate

The gate B65 designed for a waterway of a small width of 5m as shown in the geophysical image (Fig. 7). Several devices reduce the velocity of water flow at the door. First, the C5 waterway has been built, which is a diversion canal with a connection point making here a direct junction between C1 and C2 (in the physical continuity of C1 inside the city), without going through the Water-gate B65 but further north through the rampart (see Fig. 5). This type of canal makes it possible to reduce the flow in C1 before crossing the gate and to re-inject water once inside the city on the peripheral canal C2. Then, changing the path of the canal just before crossing the door, forcing it to form a curve with an angle of more than 90°, is another way to reduce the flow rate. At this point in the course of water, the dyke D1, which continues to the Parrot gate, no longer dams the canal but another reinforcement device was built to support the curve course of C1. A

[1] It is possible that further upstream, the very wide dykes of C1 result from reinforcements over time.

large plain land is laid out to the north and to the south allowing water to be channelled to the north and to the south. And, in the same time, providing a strip of land liable to flooding in the event of an overflow because of its curved trajectory. To the south, i.e. on the concave bank, where the pressure is stronger, this plain land is 15m wide at its maximum depth and a large reinforcement wall starts from the south pier of Water-gate B65 towards valve C6. It is not easy to determine if this wall, whose power seems to decrease towards the southeast according to the geophysical image, has been eroded over time or if it was designed with a large opening for the evacuation of water (visible between the wall termination and drain C6) (Fig. 7). In any case, the existence of this wall implied that the space immediately south of it, forming a triangle between the dyke and the rampart bounded on the south by the Parrot Gate, was itself elevated at an altitude higher than the plain-land but impossible to restore without excavations. If this system has an obvious utility in the management of the water entering the city, having no doubt been designed for this purpose, we also see there a space with a landing stage function before entering the city. Finally, a valve (C6) was installed in the curve of the canal to evacuate the overflow of water to the south (see Fig. 7). The aerial photography of G. Gerster of 1973 shows whitish deposits of the surface at the outlet zone of drain C6 resulting from repeated water spreading with a typical fan-shape. The slightly concave outer limit of the dyke D1 certainly shaped by the erosive action of the water at its output of the drain suggests that the C1 overflow valve (C6) was regularly active.

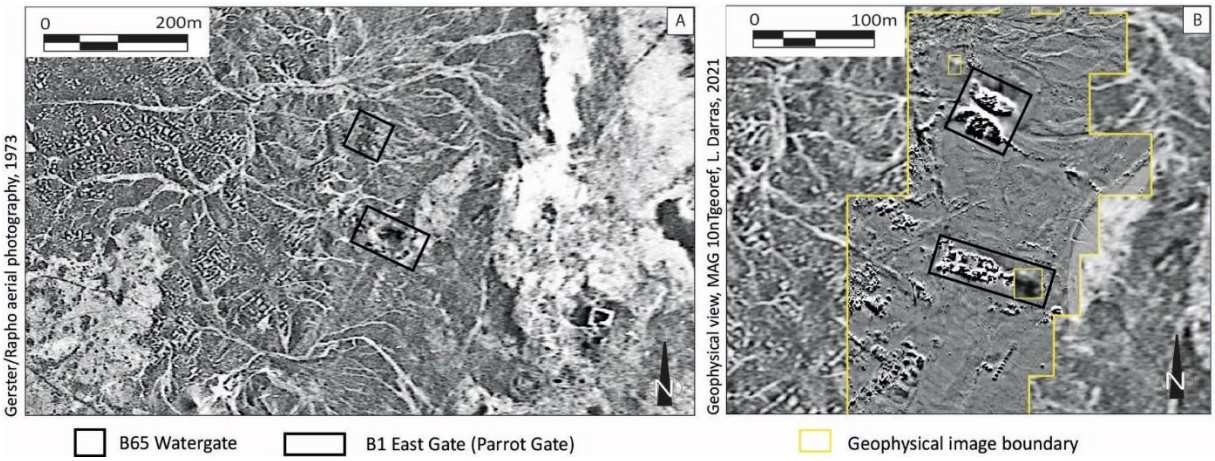

***Fig. 8** – The C6 valve and its relationships with the East Gate B1 (A).*
The flooding area extension from the C6 valve (B).

By controlling the exit of the water into the plain, the valve becoming a pressurizing device, it was also probably a means of protection in the case of an invasion. As such, the location of the C6 valve just upstream of the Parrot Gate, with a flooding zone that can reach the front of the gate according to the aerial photograph of 1973 (Fig. 8), makes it another defence device for this strategic sector of the city. We can consider that it was used during the siege of the city in 1763[1].

The architecture of the Water-gate B65 consists of two semi-circular elements in elevation facing each other (see Fig. 5 and Fig. 7). The shape of the southern one is sharpest, but the two had to be identical. To the south, the pier of the structure measures 43m in length for a maximum of 20m large. The width between the two piers is about 5m, which is the C1 canal gauge before it enters the city. On this distance, a fired brick vault sturdy enough to support the rampart probably covered

[1] The plugging of the eastern entrance of the Parrot gate with raw brick and the abundance of projectiles found on-site support this hypothesis (Parrot 1933: 177, Huot, Rougeulle et Suire 1989: 40).

the canal. We can think that the passage could also be closed to navigation, for defensive reasons already mentioned, thanks to a grid or chains system activated from the upper part of the gate. The symmetrical semi-circular shape is specific to the two known massive water-gates of Larsa, the other (B17), prospected in 2019, located at the south-east, with smaller dimensions of 37m in length and 19m large for its southern pier. The pressure exerted by the water on each pile is reduced because it is distributed along the curved line and at the same time, the flow is concentrated to increase its velocity. Another undeniable advantage of the semi-circular shape is to limit the accumulation of sediments that will be done more quickly in the angles of a geometric construction.

Located at the crossing point of the water, water-gates are massive constructions (especially B65) whose technical design is adapted to the constraints specific to hydraulic flows. Such technical skills in hydraulics could be ancient because the so-called "bridge" of Tello (Margueron 2005), in the third millennium, could fall into this category of construction[1].

From C1 to C4: the intra-urban watercourse

Inside the city, the flow in the C2 canal is directed northward on 1.2km, following the contour lines (Fig. 9). On the first 200m of its intramural course, it is joined by a first canal (C10) to the west flowing from the city center, of small size, and by a second (C5) to the east, which is the diversion canal of C1. The angle with which it connects with it shows that the primary function of the canal C5 was to bring more water in the internal hydraulic network of the city. After their junction, the canal C2 is significantly wider, in the order of 20 to 22m in general. The irregular direction of the intramural canal C5 could be explained by successive modifications of its layout in order to replace its connection point after the throttle visible in the width of the canal C2. Originally, it may have been a subsidiary waterway during the construction of the gate and, occasionally, during maintenance work due to its proximity to Water-gate B65. We can notice that the outer trajectory of the canal C5, until after the rampart, is oriented towards this narrowing. Throughout the urban hydraulic network, these narrowing of the width of the canals are also observed at two nodal points of the major C3 canal, from which other distribution canals leave. The eastern sector of the city was a residential area and there must have been diversion canals between C10 and C2. In the light of what can be observed on the canal C2 further north and again, several times, on the canal C3, it must also have been a connection point for the road network (infra, 6. The hydraulic system).

Finally on the east sector, the photo-interpretation of drone imagery and field observations revealed the canal C4 layout between the southern end of the 'Grand Canal' (infra) and the rampart that it crosses between the Parrot Gate (East Gate) and the relief of the 'Chameau'[2]. The passage through the structure is arranged at an angle on three meters wide with a reinforcement of fired bricks on its south side. Along its route, several connections with other canals to the north and south have been observed in the field (Fig. 10), the aerial photograph of 1973 confirms this. Beyond the rampart in the plain, this canal joins 200m further a peri-urban canal northeast/southwest (C60), itself fed by C1 major canal.

[1] With the function of supporting the rampart of the town, of which we know several gates and part of the layout thanks to French excavations (Parrot 1948). The city wall system has a complex history (Rey and Lecompte 2020), so an eastward extension encompassing part of the main canal is conceivable. Geophysics could easily decide this point.

[2] 'Tell of the Camel' to the southeast of the site of Larsa, as a reminder.

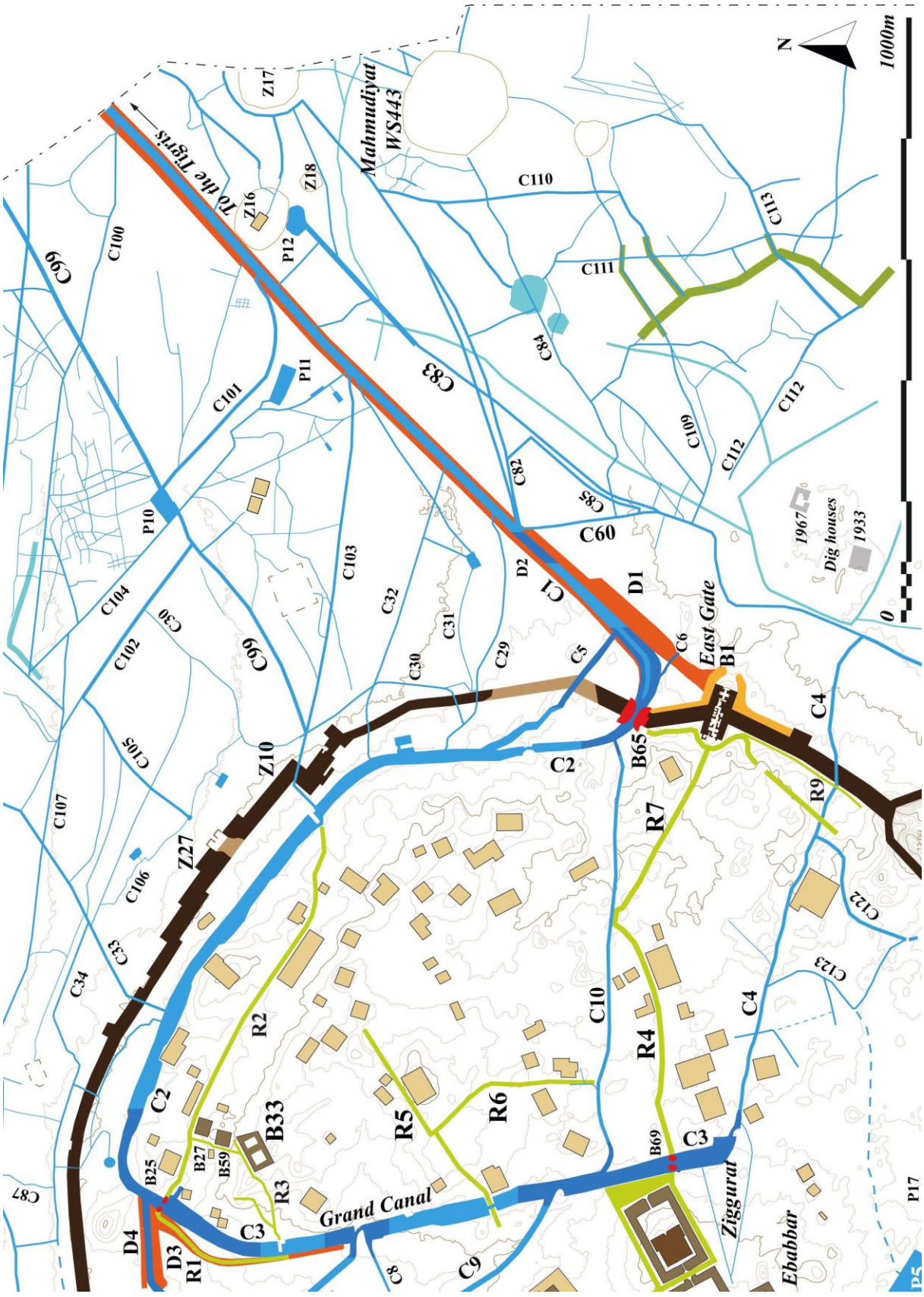

Fig. 9 – Detailed plan of the intra-urban C1-C4 system.

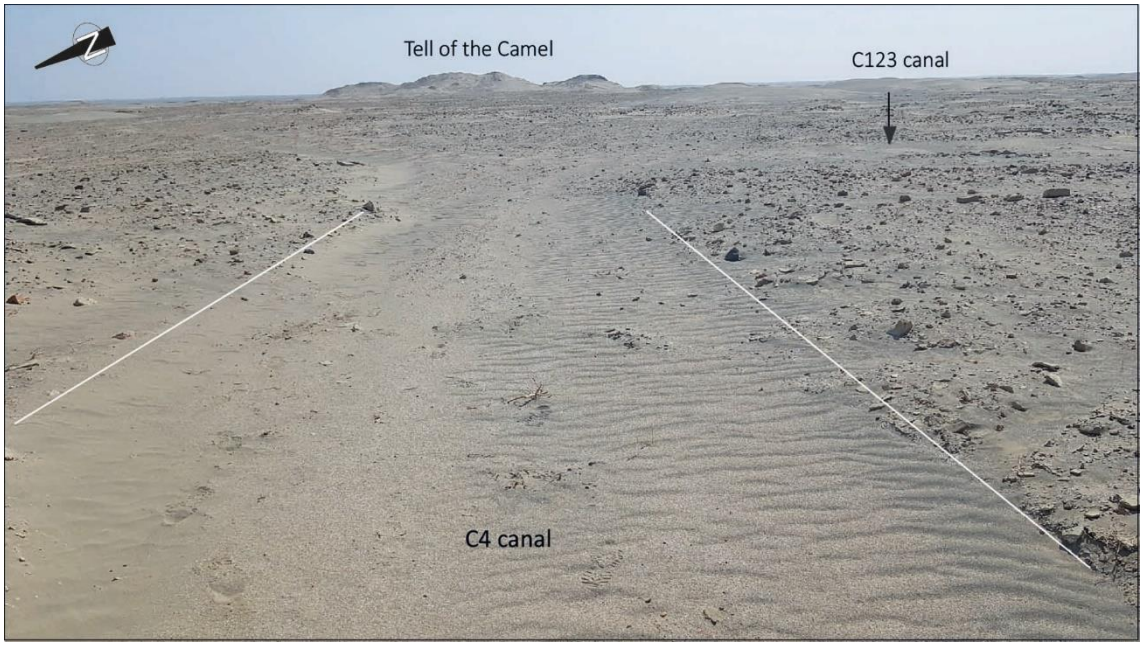

***Fig. 10** – A part of the canal C4 to the east and its branch with the canal C123 (photo L. Cez, 2021).*

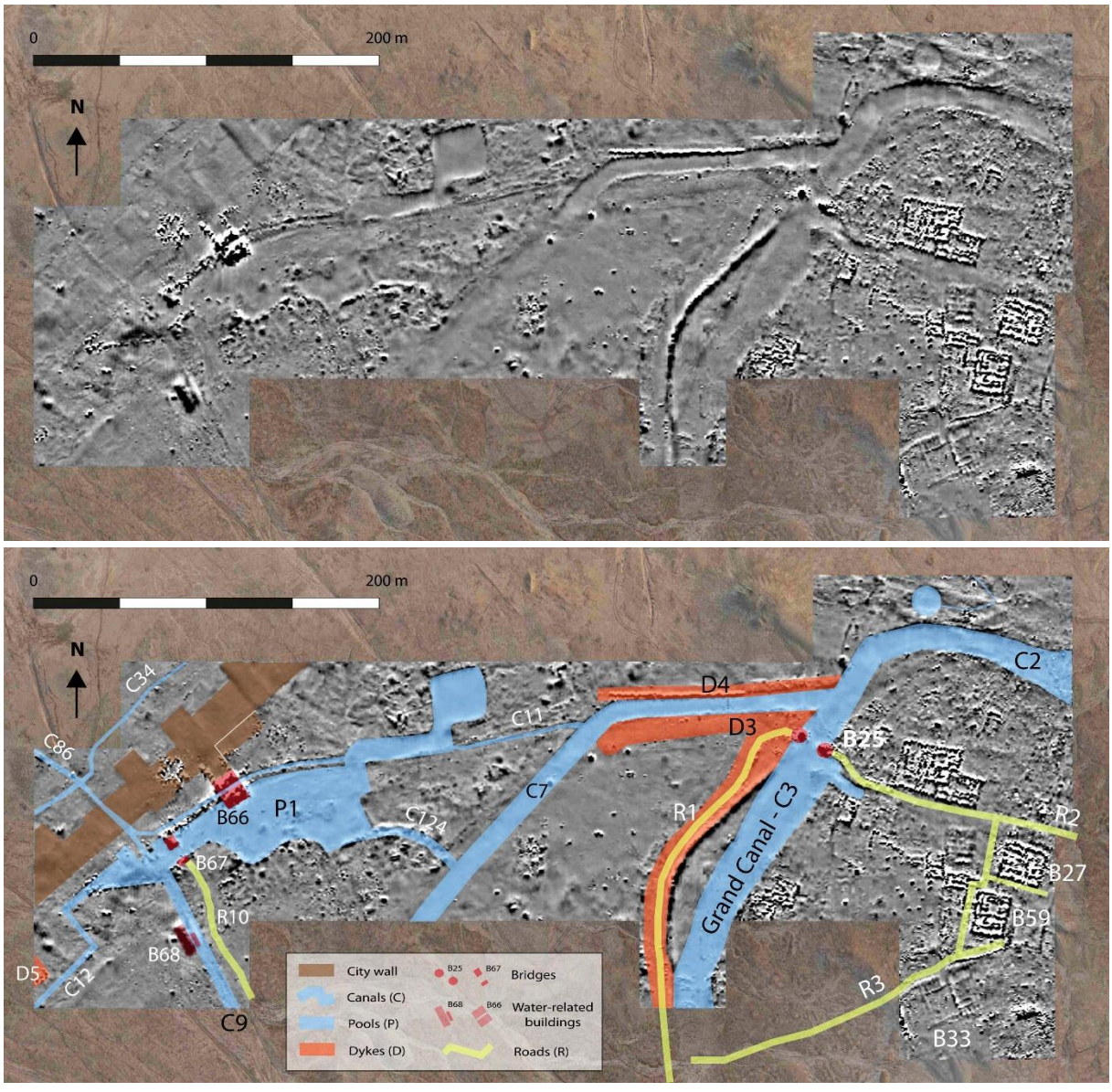

***Fig. 11** – The North Sector: raw plan and interpreted from the geomagnetic image.*

2. The North Sector

Geophysical main results (L. Darras and R. Vallet)

In 2019, magnetic prospecting to the north of the site had revealed with great clarity the network of the city's major canals, at the junction of the Northeast Peripheral canal (C2) and the Grand Canal (C3). The sector was therefore continued in 2021 towards the west on six additional hectares (Fig. 11). The canal that ran west (C7) in the continuity of the canal C2 turns southwest where its course becomes much more blurred. This is certainly due to episodes of flooding (well attested by aerial imagery) that washed out and "smoothed" an area that could be devoted to water storage and agriculture (infra). A pipe runs west (C11) from the C7 canal to feed a large basin (P1) with an irregular outline, but delimited to the south and west by facing walls probably made of fired brick. Immediately to the northwest of P1 passes the straight alignment of the rampart. The northwestern gate of the city, already spotted on the ground in prospecting since the 1980's, is perfectly visible as well as several powerful bastions on both sides of the gate. The signature of the rampart, very homogeneous, is identical to that of the eastern sector, although less striated. Two strong magnetic anomalies, with a value of 50nT, typical of baked brick, reveal two constructions, square or rectangular, linked to the hydraulic network, as one is crossed by a large pipe (building B66, also associated with the rampart), the other by canal C9, on which it is partly established, to the south-west. The latter canal is very washed out here, but its perfectly straight alignment, coming from the Grand Canal and passing to the east of the palace of Nur Adad (infra), remains perceptible.

Discussion (R. Vallet and L. Cez)

The north-west Gate B56 had been known since the surveys of the 80s, but only the baked brick facing of its passage, 3.6m wide[1]. The geophysical survey revealed the limits of the rampart, in raw brick, and provided other information on its characteristics. The wall, as it can be measured, is 20m wide, as in the eastern gate area. We can be assured that this is indeed the width of the curtain wall itself, not an embankment forming a base, since the gate is clearly delimited between the two sides of the wall. This one is equipped with bastions, of which the first two framing the gate are 22m apart, measuring 15m wide by about 12m outward projection[2]. These structures occupy an area of at least 180m^2 to which must be added the depth of the curtain wall of 20m (i.e. an additional 300m^2). Even if the surface was smaller at the top of the structure for more stability, an area of this width was suitable for the parking of large troops and for accommodating firing gear.

A strategic crossroads of the hydraulic network: C2-C3-C7

The study of the northern sector reveals a complex hydraulic system linking major structures such as C1-C2-C3, to which more modest diversion structures and large basins are connected (Fig. 12). Canal C2 runs along the rampart and, on reaching the north, divides into two branches[3]. The main branch takes a southerly direction and crosses the city through its center forming the main artery called the Grand Canal (C3 in the numbering of hydraulic structures). It should be noted that the angle of C2–Grand Canal is less important than that of C1–C2 but the segment of the canal that

[1] Visible on the surface over 19m long (Huot, Rougeulle and Suire 1989: 42) for a total length of 20m.

[2] Another further south seems even more extensive.

[3] A junction, who is not in doubt on the aerial images of G. Gerster but whose branches have been interpreted until now as streets (Huot, Rouguelle and Suire 1989: 23, 35, fig. 2b and 9a).

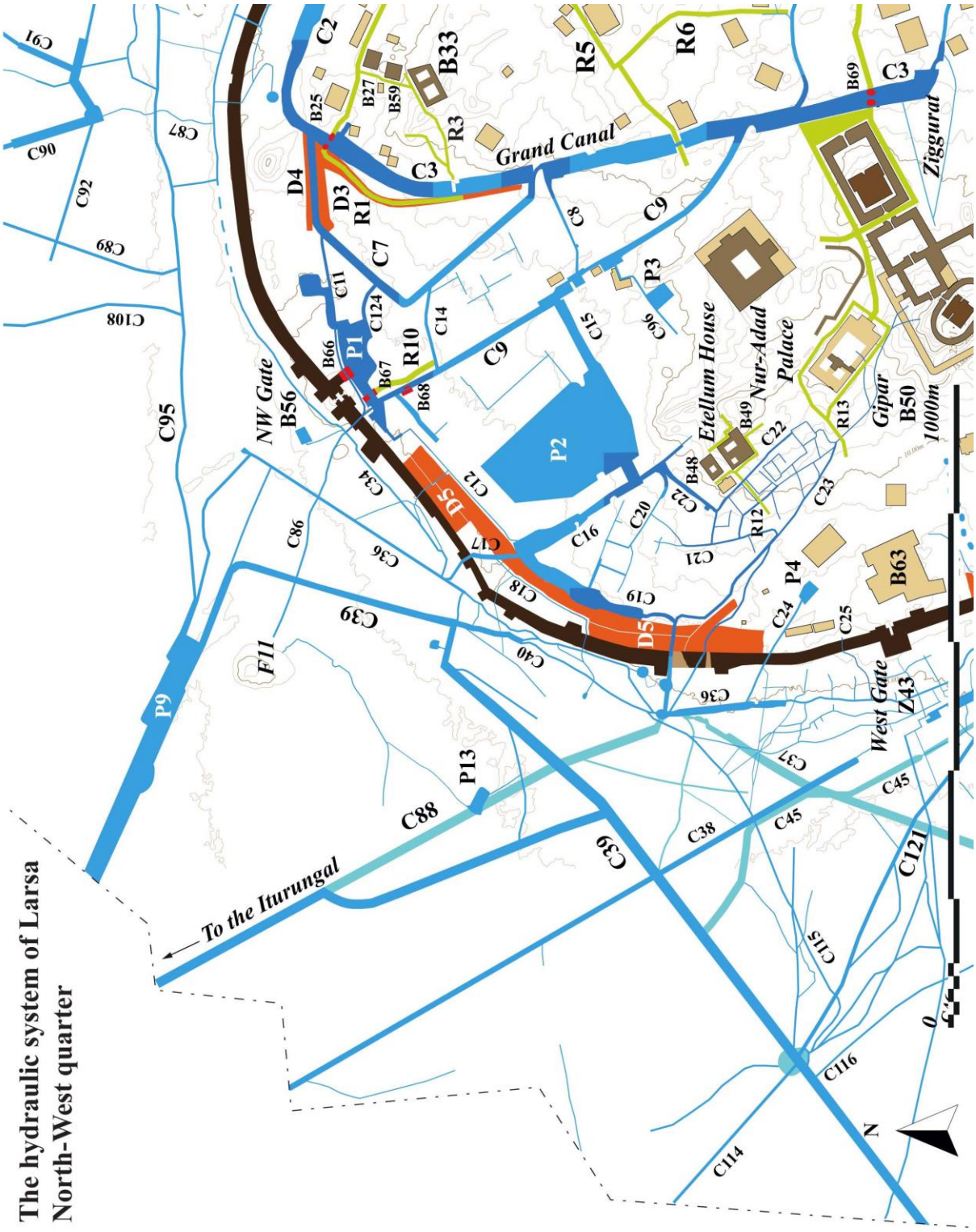

Fig. 12 *– Detailed plan of the hydraulic system of Larsa: North-West quarter.*

has a curved course is visibly narrowed. As previously for the passage C1-C2, this curved passage C2-C3 also seems to have been designed to facilitate water circulation and prevent flooding. A strip of land contiguous to the canal to the southeast, at a slightly higher altitude, operates a transition between the canal and the urbanized area, allowing the overflow of water but, here again, probably used as a landing stage. Its position is indeed strategic for unloading goods at the very north of the northeast residential area of the city. It should also be noted that the land is less wide than the previous one, located at the entrance to the Water-gate, but has a significant depth of 13m. Opposite the plain-land, a thick facing reinforcing the hydraulic structure in its concave bank subject to water erosion reinforces the north bank of canal C2, where the curve of the channel is

most pronounced. To this is added a valve fitted out on this same bank, which diverted the water from the canal when it was already redirected towards the southwest. The route of a pipeline directed towards the northeast is visible there for about fifty meters on the geophysical image (not yet represented on the plan of the city network, see fig. 13B as “valve of C2”), to the west of the small circular basin to which it was most likely to be connected. The hydraulic functioning of this artisanal sector dedicated to the production of ceramics (infra) requires especially an enlargement of the geophysical image.

The other branch starting from C2 (C7) allows, by a system of successive diversions, to supply the western sector of the city, which shelters several basins. The first remark that can be made is that canal C7 is not located in the direct extension of C2 layout but follows a drop of about forty meters to the south. This shift can be related to the presence of a small eminence named “Eagles Mound” (Tell F10). Identified as a production site (Huot, Rougeulle and Suire 1989: 36), this low mound, smaller than the Tell F11 (see below) and partly masked by the sands (see fig. 13B), was dedicated to the production of fired bricks, while potter's kilns, also from the 2nd millennium, are located immediately to the east (mission survey). The location of this former site in the immediate vicinity of the canal C2 is logically explained by the water needs for the production of bricks and pottery. The small basin located just north of C2 and fed by a diversion further east responds to this need for a local water supply. At the same time, this structure, although modest, may have contributed to regulating the flow of C2, the diversion being placed before its delicate change of direction of the latter towards the south. The constructions present in the northwest corner of canal C2 explain that canal C7 could no longer be located in the continuity of the East/West segment of C2 towards the west. The canal C7 is probably therefore a late addition to the C1-C2-C3 system to supply water the western part of the city. From a strictly hydraulic point of view, the C7 canal relieves the C2 of part of its flow at the place where the pressure exerted by the water is the strongest.

The entire section of the C3 canal between B25 and the junction further south with canals C7 and C8, is in fact equipped with a long dyke (D3) to the west, where the route of the canal is still curved. A 120m long earth-plain existed between the canal and the dyke, which was probably used as a flood zone in the event of the canal overflowing, although at this point in its course, the canal does not have a curved trajectory but on the contrary rather in a straight line. However, its template increases significantly after B25, which favour phenomena of overflow and rupture of the canal's lifting. It is possible that overflows led to reinforcement devices carried out on the curved part of the canals C2-C3 layout and on the C7 derivation. Two powerful earthen dykes 8m wide, revealed by the geophysical image, framed the C7 canal along its east/west segment. To the north, D4 has an exposed baked brick-facing wall 80m long. The D3 dyke to the south adjoins the western dyke of the Grand Canal with which it forms a right angle. In any case, these reinforcement works can only be understood with regard to persistent weak points in the hydraulic system, with maybe one or several flood episodes or infiltrations, extending on 5500m^2, originating from the Grand Canal (C3). Since flood deposits cover a large area west of the canal C3 but without any spatial connexion with C3 due to the D3 dike itself, it is not possible to assign these events to it, but it cannot be ruled out. Indeed, these traces of ancient runoff seem to come, at least in part, from the canal C7 further west. This canal being more recent than C3, these deposits masked possible older traces coming from C3 and, more recently, traces of modern wadis runoffs (Fig. 13). A major part of this large flooding sector clearly visible on overall spatial documentation originates from the diversion

canal C7 at the beginning of its southwestern segment. It should be noted that this occurs precisely at the place where it is no longer dammed. No longer held back by the two dykes on either side, the water from C7 must have spread easily. This shows that the template of C7 was not adapted to the flow passing through it. After a course of about 125m in a straight line, the C7 canal turns southwest for about 100m and then again in a southeast direction to join the Grand Canal just over 200m farther. On the path of the C3 canal, another flooding sector further south clearly originates from the Grand Canal, which is explained this time by the flow redistribution system with several branches and, probably, associated control valve systems.

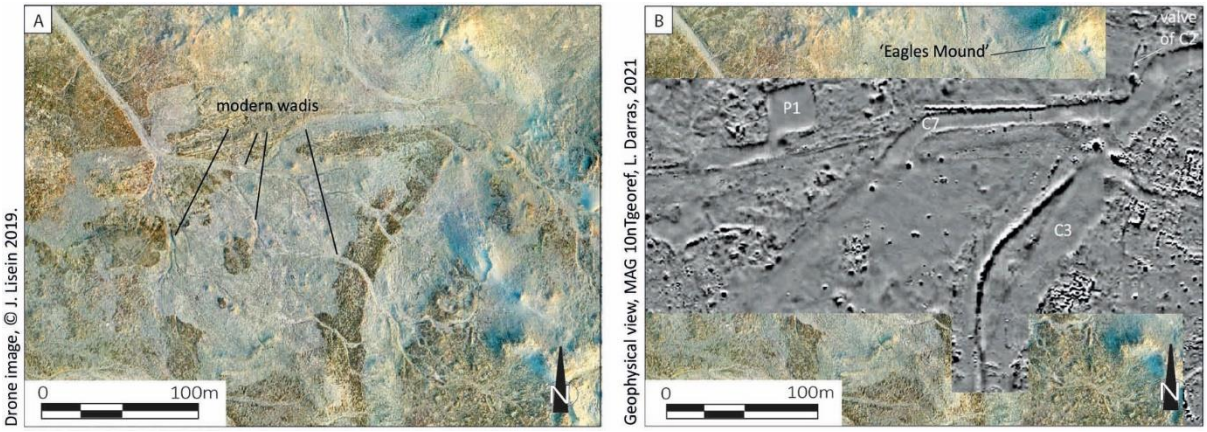

***Fig. 13** – Flood sector to the north of Larsa on ortho-photo by drone (A) and geophysical image (B).*

Canal C7 was therefore most likely a diversion canal from the Grand Canal with a connection point on this same artery further south. It fulfils the same function as C5 on a previous articulation point of the network, i.e. the curved crossing of Water-gate B65 (passage from C1 to C2). This interpretation assumes that the topography over the whole course of C7 was relatively constant and that there was only a minimal difference in altitude between C3 and C7. Precisely, the level curves on the map of Larsa show an increase in altitude at this location. However, the topography restored from the drone images must be considered with great caution because it includes the volumes of sandy accumulation. According to the level curves on the 2021 ortho-photo by drone, the Grand Canal sees its slope increase towards the south, rising from 5m to 11m in altitude between its two ends, i.e. over a distance of almost 1km, which seems unlikely. This is explained by the differential accumulation of sands transported by the wind, more marked towards the southeast (see infra, 3. The West Sector). We can clearly observe the trace of the Grand canal C3 in the north, very clear in overall spatial imagery as well as on the field (see Fig. 19), but much less in the south where it is masked by sheets of loose sand and runoff.

On the C7 canal, several branches have been identified: C11 and C124, with a curved layout, which feed a basin (P1), C14 that is connected to the C9 canal further to the west. The area between C3 and C7 being masked by flood deposits, we cannot know its organization, if a basin occupied it for example.

The basin P1

The basin P1 has a modular plan, made up of several small successive water reservoirs extending on 265m long and covering a total area of 6640 m^2 (see Fig. 12). Given its shape, it was probably enlarged over time according to needs and available space. The southeast section of the canal C7 is

oriented towards the southeast end of this basin. P1 should therefore be supplied by C7 and C9 further west (infra). Its waters were evacuated by a pipeline extending C11 along the basin to the north to join another to the west. Beyond the rampart, C86 continues its course in the plain for more than 330m in a north-westerly direction to the Tell F11 (WS 442). This houses several brick kilns[1] dating from the second millennium, but it is occupied from the beginning of the third millennium (Adams and Nissen 1972: 237) by artisanal installations[2].

The location of the basin just behind the northwest gate B56 raises questions. Here again, the topography and operating constraints of the existing hydraulic network probably explain this configuration. In terms of accessibility, the presence of the basin required the construction of a passage. A small bridge spanning the 5m wide of a narrowing point of the basin has indeed been built (B67), whose large north rectangular pier is clearly visible. From this bridge, a road (R10) running towards the city center along the C9 canal has been identified. The location of this structure was also to have a defensive advantage. To the west, P1 was also connected to the network by another long and small pipeline (C12).

Regarding the C9 canal, the direction of the flows cannot be determined solely from the contour lines, due to the problem of the topography of the site, but it seems more likely that it was fed by the larger Grand Canal. We observe at its southeastern end, a direct connection to C3, then to C8 to the north, which is a simple junction channel with a narrow section and to a last one further north (C14) of equivalent width. Another element comes from the traces of flooding visible on the aerial photograph of 1973, starting from the angle formed by C15 and C9 and extending north. Finally, the canal section at its northwest end, just before joining the P1 basin is slightly reduced compared to its central section.

In this sector apparently empty of construction, two buildings were discovered, B66 and B68, whose fired brick bases are particularly clear. B66 is a square construction of a little more than 18 x 18m, crossed in its center by the "pipeline" C11 of about 2m wide. A part of this building was already known, the wall connecting it to the rampart located less than 9m further north, with baked brick facings (11m apart, Huot, Rougeulle and Suire 1989: 42 and 49) are visible on the surface. Being connected to the rampart by this powerful wall, and provided with an equally powerful base, B66 must have had a significant elevation, probably equivalent to that of the rampart. We point out that the building prohibited any circumvention of the P1 basin from the north from the northwest gate. The construction extended eastward: the eastern face of the wall connecting to the rampart turns eastward, delimiting a massif of about 30 x 10m, which was leaned against the original inner face of the rampart. The other construction identified in this sector, B68, is of the same type but with half the dimensions of B66. Rectangular in plan and with dimensions of approximately 18 x 9m, it was crossed by the C9 canal before it joined the P1 basin. The two buildings were therefore functionally linked to the hydraulic network and to the rampart for B66,

[1] And not pottery kilns (Huot, Rougeulle and Suire 1989: 38) (mission survey).

[2] Mission survey (Zingarello and Baldi). It should be noted that Tell F11 is connected to two parallel watercourses oriented West-East and originating from the river strip to the northwest of the site. Their large size, 10 to 15m wide, as well as their point of arrival at the foot of the Tell shows that they had to meet significant water needs specific to this sector. The hydrography of the northwestern part of the Larsa site, from this period (the occupation of F11 dates back to the ED I), was already profoundly modified. The in-depth analysis of the available imagery and the acquisition of new drone coverage above this area should make it possible to highlight it.

but we lack data allowing us to advance any interpretation. It is certain that the excavation of one of the two would constitute a scientifically very interesting objective.

3. The West Sector

Geophysical main results (L. Darras and R. Vallet)

To the west of the site, a large area was prospected in 2019 around buildings B48-49 and B50 prior to their excavation. In addition to architectural elements to the east, the sector had revealed a network of small canals irrigating cultivated plots. Further west, a second, smaller surveyed area had uncovered a short section of the city's western wall. In 2021, we extended the survey to the northwest over three additional hectares (Fig. 14), with the aim of finding the continuation of the rampart and attempting to clarify the connections between the numerous canals in the sector. We did not have time to extend it enough to get a full picture of the whole sector, so our goals were only partially achieved. Nevertheless, the study of aerial images of the site (infra) allows us to fill in the gaps in the geophysical survey, which will have to be continued.

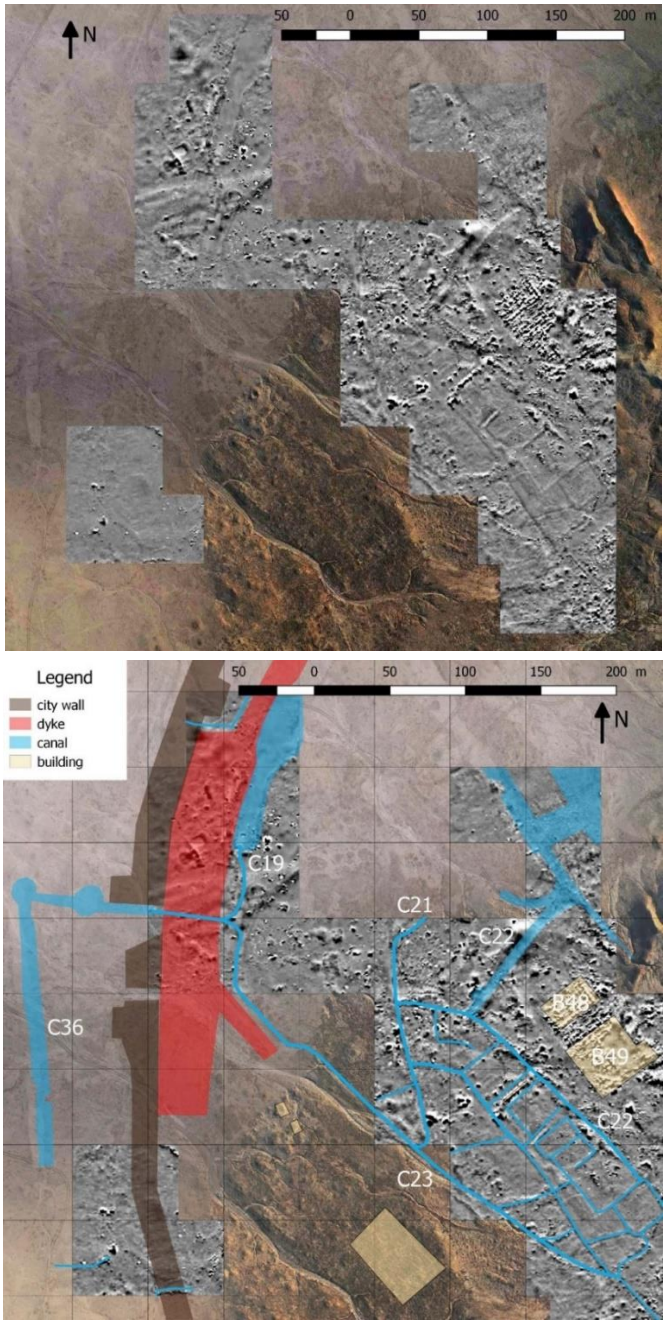

Fig. 14 *– The West Sector: the raw plan and interpreted plan from the geomagnetic image.*

To the northwest of the geomagnetic map established for the moment, three important structures are clearly visible. From east to west: the southern end of the wide canal C19, the dyke D5 and the rampart. The C19 canal decreases considerably in width to the south, where it turns westward, undoubtedly to exit the city. It is in this intensely washed up area that the drainage canal (C23) of the crops further east connects, which is not very visible in geophysics but clear in aerial imagery. Dyke D5 shows structures in the form of small "compartments", which, rather than buildings, probably correspond to cultivated plots, as there are others around the canals and basins of the sector (below). The rampart appears only very partially in the survey, but it is well in line with the section already known to the south. Further east, the whole area seems to be empty of construction and two canals of some importance are visible. To the east, the main water supply to the cultivated area (C22, coming from the east) and in the center a north-south canal (C21).

Discussion (R. Vallet and L. Cez)

The fact that the northwest quarter of the site suffers the full force of wind deflation has previously been put forward, what Margueron calls a "strong indentation" (2002: 133, fig. 115), due to its location in the path of the prevailing winds. This is already what Parrot transcribed on his topographic plan of 1933 (Parrot 1968: 209, fig. 3). It should be noted that there is a gradient of wind dynamics at the scale of the Tell of Larsa, going from ablation in the northwest to accumulation in the southeast. On the scale of the northwest quarter alone, this gradient is visible because the sands accumulation is accentuated by the presence of constructions in elevation more important to the south[1]. The excavation of the Ebabbar also demonstrated that the area of built monuments in this north-west sector had been affected by dynamics of accumulation during the late phases of the occupation of the site (Parrot 1968: 212-219, Margueron 2005: 134-135). The stratigraphy of the southern transect shows a height of 4m of detrital materials from wind erosion (Parrot 1968: 217-218, fig. 10). More recently, the excavation of the building B50 (Ait-Said, Vobauré and Vallet, this volume), with more of 4m of sandy filling, illustrates this same phenomenon of differential accumulation. In other words, the aeolian processes alone cannot explain the topography of this northwest area but the wind processes come here to accentuate the contrasts of the old topography. The accumulation of sands is favoured by the presence of buildings and is added to the deposits resulting from its natural degradation (Friesem et al. 2011). It means that the north of this quarter of the city already had a relatively flat topography during its occupation in the 3rd and 2nd millennia B.C. Let us add that the strongest notch corresponds to a relatively narrow corridor to the south where the C9 canal was located and which recent flows have deeply gullied as shown by contour lines.

The P2 basin and the irrigated area

The large basin P2 is the major discovery in the western sector, clearly visible on the aerial photography of 1973 but also on the field where a density of carbonate concretions was noted during the field survey of November 2021. This work, whose dimensions of 26,000 m^2 are out of proportion with the other known basins of the city (with the exception of the city's port, to the

[1] On these buildings such as B48-B49, some of them being moreover monumental complexes such as B50, Nur-Adad Palace, Ebabbar and the Ziggurat, one can observe sandy mantles on their windward sides and obstacle dunes with decreasing slopes spread out in their leeward sides. Conversely, the good visibility of the hydraulic structures to the north and northeast can be observed on the fig. 3.

south, see below), is located in the only wide topographically flat sector of the city (Fig. 15). The main arteries of the hydraulic network in this area are all connected to it: C15 at its southeast corner, C16 at its southwest corner, themselves connected to C9 to the east, C20 and C22 to the southwest, C19 to the northwest. A connection probably existed at the northeast corner of the P2 basin where a canal departure was restored from C9 heading west just before its connection with P1. Similarly, a canal section could have connected C16-C19 to this basin, but we have not yet succeeded in demonstrating this clearly.

***Fig. 15** – The basin P2 in a flat area (photo L. Cez, November 2021).*

From 2019, surveys revealed the presence of cultivated areas in this sector (Darras 2020: 26). The nature of artefacts, the lithic material with an agricultural function dominating there, in particular sickle blades (Giraud, this volume), and small canals delimiting irrigated spaces, clearly shows that an agricultural plot was inserted into the urban landscape of Larsa. It can be observed all around P2, on either side of C9, between C16 and C19 as well as between C22 and C23. Without taking into account the area of P2, at least 18ha (or 180,000 m^2) were dedicated to agriculture[1] (more of 20ha with P2), that is to say 10% of the territory of the city. It should be noted that to the south of the town there is another concentration of lithic tools (Giraud, this volume). Agricultural activities must therefore probably exist outside the western zone, but on smaller areas. The plots located to the west of B48 and B49, of irregular quadrangular shape, some forming squares of 25m by 25m, were irrigated thanks to the C22 canal, which is a branch of C16 ending about 30m from B50, as the cultivation area.

About 8m west of B48, a mudbrick building with 0.8m wide walls, approximately 18 x 14m (252 m^2), was constructed along the canal. Given the plan of this building, formed by rows of rectangular stores, and its location, it was probably a granary. A raised fired brick causeway (R12) crossed the cultivated area towards the west gate of the city Z43, at least 2m wide[2] and preserved over 37m long. To the north, plots were irrigated by C20 and C19 canals and by C21 to the south. The C23 canal provided the drainage of the entire sector, to the southwest. It also served as a drain for the north-western part of the Ebabbar: we follow it in imagery to the rampart, where it splits into two

[1] From route R1 in the east to canal C23 in the west and from line C19/D5/P1 in the north to line C22/C15/C8 in the south.

[2] A width of 3m is most often observed but not on the whole structure due to erosion.

branches before reaching it. One of the branches joins C19 to the north, the other passes south of a sort of extension of the D5 dyke to the southeast to join C36 directly outside the city.

The Dyke D5

The D5 dyke is one of the largest urban elements discovered so far, which stretched over 600m in length. But it should be specified that all the major hydraulic installations had to have such reinforcement structures, like what has been identified along the canals C1, C3 and C7 for example. These architectural elements have not all been preserved. The P2 basin in particular, given its dimensions, had to be framed by massive (and cultivated?) earth levees or else the C2 canal, which had a curved course as a peripheral canal. In the current state of knowledge, we can however note that the D5 dyke is of a higher power than the other structures of this type known in Larsa. Several reasons can be put forward. The density of hydraulic developments in this sector should lead to an increased risk of large-scale flooding, especially if a significant slope characterized the area. We can also see many traces of spreading on the aerial photograph of 1973. This area dedicated to irrigated agriculture also had to be drained efficiently. In this respect, nine water evacuation pipes across the enclosure wall, of varying importance, were counted between the northwest gate B56 and the western gate Z43 (see below). We thus also understand the function of the south-eastern extension of the dyke D5, which separates two drains starting from C23. The drain located to the north joining the main drain of this whole area, namely C19, the drain further south could be a later drain aimed at relieving the first one and improving the drainage.

Another point is the proximity of P2 and especially C19 to the rampart, which required a sufficiently strong dyke to protect it. The western section of the dyke merges with the rampart itself. The dyke has probably been reinforced over time, even doubled, because on almost its entire length, except at its southern end, there is a line dividing it into two parts, east and west, 20m wide each. In the center of the dyke, the western part seems absent, over a length of about 200m, but it is possible that flood deposits mask it. We can also think that these constructions aimed to fight against aeolian processes, this sector being subject to deflation. On either side of the small water-gate formed by two small bastions flanking the canal C17, the width of the curtain wall is only about ten meters. We also notice that the wall's footprint forms a slight bulge towards the interior of the city, which is compatible with the undermining action of the winds, while it re-widens to the north towards the northwest gate and to the south. Further south, where it meets the D5 dyke, the rampart seems to widen up to about thirty meters, but it is difficult to determine from the geophysical image whether it is the curtain wall alone or including different states of the wall and associated structures, like a glacis. It should also be noted that the rampart in this sector had several bastions of different types, some of modest size, including one internal, some sticking out strongly of the curtain wall and unevenly distributed.

The rampart can be easily followed through the whole area. To the south, a baked brick pipeline (C25) crosses it perpendicularly. Its geophysical signature is strictly identical to that already identified in the eastern sector, with a footprint of 20m, the same as to the east and northeast from the city. To the northwest, the sector of the water-gate which the canal C19 passes has been destroyed by erosion, about 25m long, and the recent wadis having often (but not always) borrowed the course of the old canals. This point confirms that runoff must have been active in the area and hence that it must have been a sloping area.

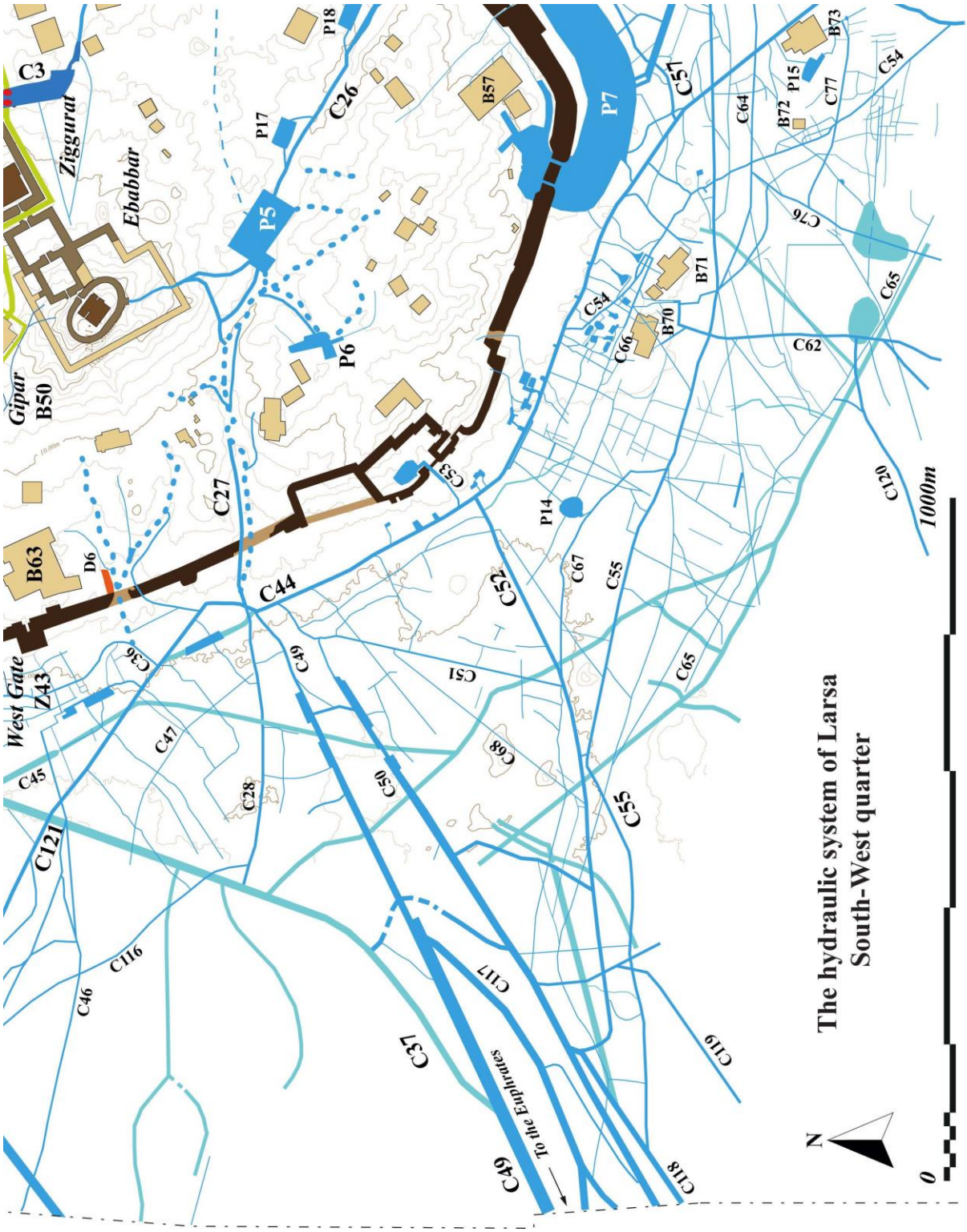

Fig. 16A – Plan of the hydraulic system of Larsa: South-West Quarter.

4. The South Sector (L. Cez)

Our knowledge of the hydraulic system of the south part of the city is still incomplete and is based for the moment on photo-interpretation of drone imagery and field survey. The magnetic prospecting stops at the southern end of the Grand Canal (C3) and, to the east, covers the peripheral zone of the city along the rampart until the relief of the Chameau (Fig. 16A and B). The Water-gate East B17 area is the only one investigated by geophysics, showing the southeast section of the canal C26, of about ten meters wide at its crossing point of the gate. It should be noted that the silting is significant in the south of the city.

Fig. 16B *– Plan of the hydraulic system of Larsa: the entire southern network.*

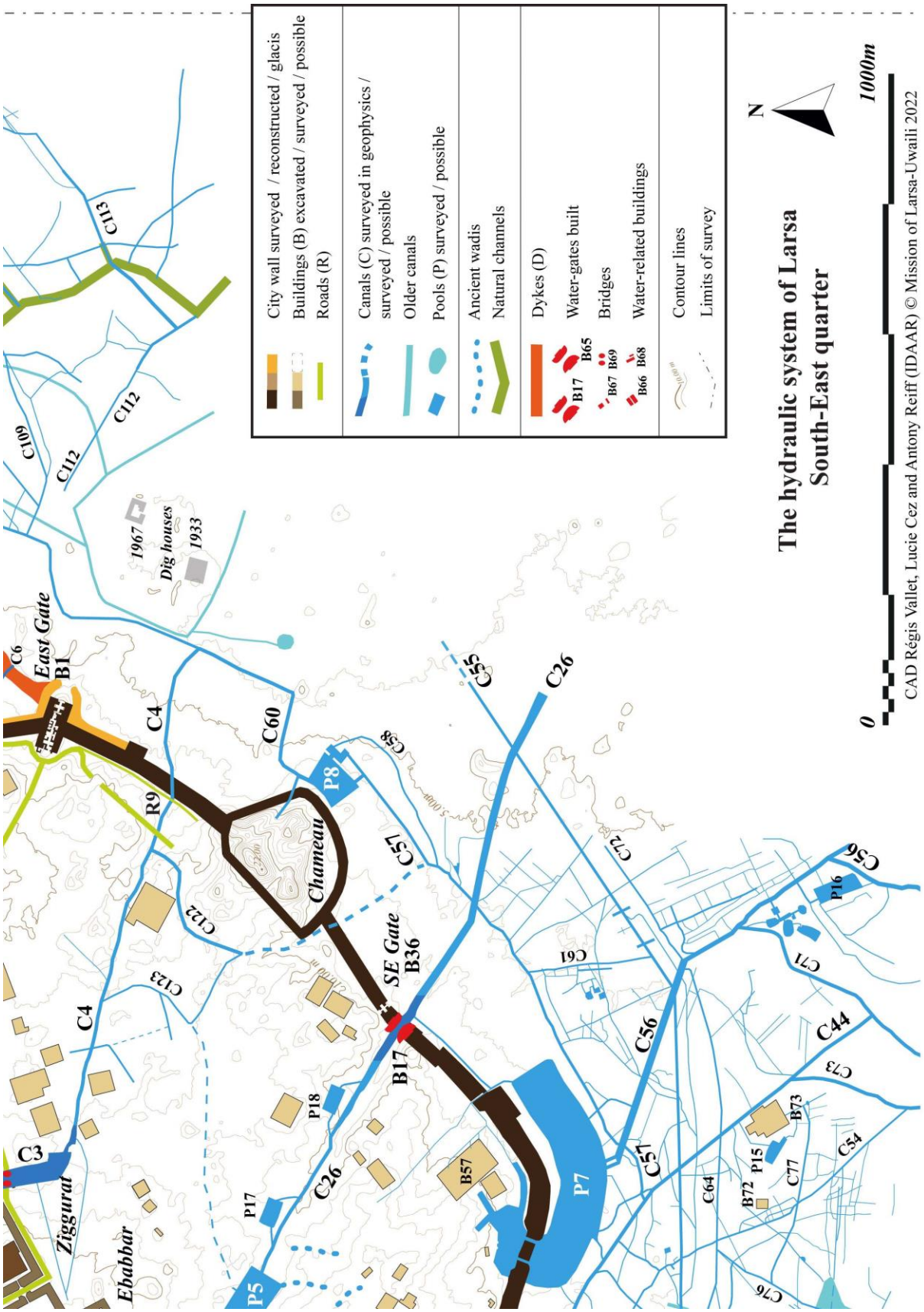

Fig. 17 – Detailed plan of the hydraulic system of Larsa: South-East quarter.

Despite this, field study and the analysis of drone imagery revealed hydraulic structures, but fewer, a priori, and smaller. The south sector seems not have large major works as we know it in the north of the city. The presence of relief is here a key to understanding the particularities of the southern hydraulic network. This area is more elevated in altitude than other quarters, reaching 13m in the

center, while elsewhere on the site, this altitude can be reached or even exceeded but only locally, in connection with the elevation of a building (in the west sector) or linked to a dune (east sector).

One of the main arteries is the canal C26 (Fig. 17). It had been firstly extended to the northwest, its path making the junction between the eastern and western parts of the city. Fieldwork showed that this canal did not continue west but was interrupted roughly in the center of the south sector, at about 400m in the direction of the northwest from Water gate B17. There, he was fed by the large basin P5 of 100 x 50 x 60m, i.e. 5500m^2, which was connected to the Ebabbar to the northwest and probably to the C4 canal through the smaller canal C123 to the northeast. It is possible that other canals connected to it, but we have not yet identified a direct connection between the Grand Canal and the basin. Ancient water spreading traces are clearly visible on the aerial photograph of 1973 on this wide north-west/south-east strip of the intra-urban territory between the canal C26 to the south and the C4 canal to the north, which suggest that a hydraulic network was present there. The network south of P5 up to the rampart is also poorly known at this time.

On its course, the canal C26 was equipped with two very close small basins, P17 and P18, allowing the storage of water. These two structures were supplied by their upstream branch and could be emptied by their downstream branch. The canal flowed almost in a straight line across the plain, beyond the Water-gate B17. This has the same technical characteristics as the B65 door (supra), but is smaller.

To the west of the P5 basin, one can observe the start of an important wadi flowing north then west. In this sector where many temporary watercourses have dug gullies, this waterway stands out for its width and its fairly deep bed. This tends to show on the one hand that it is an area of relative altitude of the ancient city, as already pointed out; on the other hand, that this waterway might have been functional during the occupation of Larsa. The connections with other canals to the north from the Ebabbar network and to the south with another small basin P6, of about 1850 m^2, and other branches visible more west again confirm this fact. Moreover, the physical relationship of this watercourse to the rampart to the west, i.e. its exit point, also shows this because even if this area is not clear due to recent gullies, the rampart is clearly seen to be interrupted to allow him to be evacuated from the city (infra). The question is whether it was a hydraulic structure built to supply water to the south-west sector of the city, like of what the C26 canal does to the west, partly modified by the recent runoff of the wadi[1]. Some canal branches are made directly on the bed of the modern wadi, but its lateral dynamics, i.e. the undermining on the concave bank and the sedimentation on the convex bank, widens and masks the width of a hypothetical hydraulic structure located below. In this hypothesis, this structure must then correspond to both canal segments, C27 and the other roughly aligned to the east, undoubtedly be connected to the large basin P5, as a feeding pond, with a branch to the south that connected it to P6 basin. However, it cannot be ruled out that this wadi is an ancient watercourse, which was channelled. In this case, we can assume that intermittent flows of high energy linked to rainy episodes may have interfered with the management of this section of the hydraulic system, given the topography of the sector.

[1] One can observe its steep meanders the (single) channel wandering laterally between the concave bank, which it erodes and deepens at the same time as it builds a bench of convexity on the opposite bank.

5. The city Wall (R. Vallet)

The last works have thus revealed the ramparts of Larsa, known only until now by some scattered elements. The layout that we drew in 2019 was, for the most part, only a proposal of reconstruction, based on our first observations. Thanks to all the imaging done this year, it is now fixed. Without going back over the details of the elements already described, we can make a first overall assessment.

The route was recognized on the entire urban perimeter (Fig. 18). The enclosure wall, made of mud brick (except for the inner facing of certain gates, made of baked brick), runs for 5,376m, including the Chameau to the southeast. It draws an oval, oriented north-south, a little wider in its northern part (1550m at best from east to west x 1750 at most from north to south), which circumscribes an area of 200ha. From the outset, what is striking is that we are dealing with a unique layout, respected over time, without regression or urban extension marked by different enclosures: it is always the same wall that successive sovereigns have maintained, improved, rebuilt. It is true that its life span was relatively short, barely a century and a half.

No specific dating elements (inscribed bricks, associated material, etc.) were found during the surveys. We therefore only have the historical data already known (year names and royal inscriptions) to provide us with some chronological landmarks. Gungunum initially erected the wall shown here in his 21st year of reign, 1912 B.C. (Sigrist 1990: 9-10). It is not known whether Gungunum started from nothing or, at least partially, from a pre-existing enclosure. In any case, Gungunum built a new enclosure to which, in the Sumerian way, he gave a name, "Utu kibale sadi" (Utu subdues the rebellious countries), a name that sounds like a warning, or a political program (Arnaud 1972: 33-34, Frayne 1990: 117-118). His son Abi-sare reinforced the wall (Frayne 1990: 124-125), of which he dug (or recreated) in his fifth year (1901 B.C.) the "hiritum" (Sigrist 1990: 12-13), a water ditch that may have corresponded to one of the large canals running along the wall[1]. Much more work that is extensive was carried out by Nur-Adad, some forty years later, who found the wall "ruined" (Frayne 1990: 149). Perhaps at the end of the very hard war against (probably) Isin, which provided him with the opportunity to come to power, i.e. around 1863 B.C., he rebuilt the enclosure, which he raised "like a mountain range". He thus not only raised the wall, but certainly increased its power, "burying sacred inscriptions in its foundations" (Steinkeller 2007: 224-226), a program that justified a change in the name of the wall, renamed "Utu umani sa-bindu" (Utu perfected his triumph). In 1837-36, Sin Iqisam "rebuilt the wall" (Sigrist 1990: 27-29), in which Kudur Mabuk, master of Larsa from 1834 to 1818, opened a "large gate" a little later (Frayne 1990: 209). After that, we do not hear any more about the walls of Larsa, until their destruction by Hammurabi of Babylon in 1763 B.C.

In this meager inventory, two remarkable absences are noted. That of Sin-iddinam, who could not help but intervene on the ramparts: fortification of the eastern gate, development of the water gates necessary for the new canals (supra), and even of the city's port (infra). It is true that these works, as important as they were, were only part of a hydraulic program that was duly celebrated (Sigrist 1990: 24, Frayne 1990: 158-160)[2].

[1] C19 inside the city, C34, C36 or C44 outside, could be good candidates (see below for the historical phasing of the canals), but there must have been many others of which we have no trace.

[2] Let us note that as regards fortifications, the reign also sees the construction of the walls of Ur, Mashkan Shapir and Bad Tibira (Charpin 2004: 105, with references).

Fig. 18 – General plan of the city of Larsa (2022).

The other great absentee is Rim-Sin (1822-1763 B.C.), who, in 60 years of reign, could not have failed to take care of the defenses of his capital, which otherwise would not have been able to hold back Hammurabi's forces for months, as they did during the siege of 1763 (Charpin 1989). But in his case, the glory of having defeated Isin, the eternal rival, monopolized from 1794 onwards all his

communication, if one may say so (31 year names from 1794 to 1763), a context in which a mention of the ramparts of Larsa would likely have been perceived as an incongruity.

In any case, for lack of excavations, it is impossible for us now to make the share of what returns to the various sovereigns, if so much that one cannot ever, be it given the levelling of the structures. All that can be said is that the structure whose outlines we can grasp can only correspond to the final state of the fortifications. However, despite the zeal of Hammurabi's diggers, powerfully relayed by erosion, the sections of wall entirely destroyed, always by wadis (except in one case), are few and of limited extent. The most important of them is to the east, north of Water-gate B65, where the wall was swept away over 160m by a series of wadis descending from the Tell in close ranks[1].

The enclosure thus remains, against all expectations, on almost its entire layout, and, where it is possible to distinguish the wall itself from adjacent structures, it attests to several widths. Near the gates and on long sections, the footprint of the wall is 20m. Without entering into a technical discussion here, we have already pointed out some of the characteristics that show, in our opinion that we are dealing with the enclosure wall itself, and not with a backfill forming a base. The structure, perfectly homogeneous, is well associated with the city gates (also 20m wide to the northwest and southeast), gates preserved above ground level (the baked brick facings do not go down to the foundation, cf. B50, this volume). It is also well associated with the visible roadways inside the city, confirming its inner faces, and, perhaps more significantly, with various structures outside (including a glacis on either side of the eastern gate, supra), confirming its outer faces. The very layout of the structure, with its many bastions of varying dimensions and clear recesses of several meters (especially when its width drops to 10m, west of the northwest gate, supra), also seems to us to be typical of an enclosure wall, and not a simple fill or substructure. It is the very base of the wall, therefore of considerable strength. But this power of 20m, if it seems to have been frequent, was not reached everywhere. Two other widths could be observed. To the northeast, on either side of sector Z27, the wall does not exceed 15m, as well as to the northwest, on a 200m long section, south of the very large bastion near the northwest gate. Further south, as mentioned, the wall falls to 10m wide (on 150m long), and similarly in some sections to the northeast and southwest of the site, it does not seem to have exceeded this width, perhaps the original width of the wall of Gungunum. On the other hand, in two other sectors, to the west and south, the observable strip can reach 30m in width (with an onion skin structure to the south), suggesting that the entire fortified system (with ditch, glacis, and perhaps several adjoining walls) can be seen there. Future work may determine the precise structure.

What could be the elevation (or elevations) of an enclosure of this strength? In this matter, without textual data, one is always reduced to speculations. But the data collected nevertheless allows us to reflect on objective bases. If one grants to the narrowest sections a ratio width/height of 1/1, the elevation of these was 10m. It is there, in our opinion, a strict minimum, corresponding perhaps to the elevation of the original rampart, that of Gungunum, because it seems clear to us that one

[1] The wadis that followed the C27 canal (and the associated ancient wadi, supra) to the west of the city washed away a 45m section, the other missing sections being no more than 25m. The only case of destruction that is not due to a recent wadi is that of the western wall of the southwestern fortified perimeter (infra), although its course can be guessed and further research would be required to clarify this area.

does not widen a wall up to 20m to leave it at that. An elevation of 15m, on the whole route, seems to us more than probable, which remains in a ratio of 1/1 for the sections of average gauge. Should we consider more? In fact, there is one remaining witness to the elevation of the city's fortifications: the Chameau. The top of the Chameau rises to 22m AMSL (measurement 2021) while its lowest visible surface remains (its southern enclosure) are at 6.5m AMSL, and the construction naturally continues further down. We know, therefore, that the fortress, attached to the rampart, had an elevation greater than 15.5m. Given the destruction it has undergone and the considerable erosion that has taken place, there is little doubt that its original elevation reached or exceeded 20m. This does not imply that the city wall had an equivalent elevation, which was probably not the case, but the Chameau proves that this was not impossible and that elevations higher than 15m could have been reached at certain points of the enclosure perimeter[1]. In any case, the ramparts of Larsa, in their last state, were truly colossal and the texts are right when they describe them as "high as a mountain", mocking Uruk as "a heap of earth" in comparison (Hallo 1991: 387).

This enclosure, as formidable as it was, had to allow for circulation, and it seems to have been provided with at least six main gates for this purpose. Three were already known, to the northwest (B56), to the southeast (B36) and to the east (B1) - very partially in this last case, supra - which we will not describe again here. Our surveys allow us to propose the identification of three more. To the west, structure Z43, projecting at least 20m beyond the enclosure, for at least 30m wide (and 2m high), certainly corresponds to the western gate of the city, as has already been proposed (Suire 2003: 10-13). Part of the internal passageway is discernible, while in the city two important streets point in its direction (R12 and R13) and a large modular building (B63), perhaps a warehouse was established in the immediate vicinity. To the northeast, area Z27 may also have housed a gate, although this is less clear, protected by a set of bastions. To the southwest, to the south of two small rectangular fortified perimeters (infra), the wall curves inward, creating a passageway about fifteen meters wide, probably leading to a gate. Note the regular distribution of the six confirmed and probable gates on the urban perimeter, arranged at an average distance of 860m[2], while small basins were systematically built nearby (except for B36, but the canal C26 passed by), probably for the refreshment of travelers and their animals. In addition to the main gates, there were secondary passages, or posterns. At least two of these seem likely according to our first observations: to the south, associated with the city's port and its warehouse (B57, infra) and to the northeast in sector Z10, a complex sector that housed a brick factory leaning against the rampart. Further work will explore all these sectors to confirm, or correct, this reading.

The circulation of hydraulic flows was no less vital for the city than that of terrestrial flows. Without anticipating the description of the hydraulic system (infra), we have seen that between the northwest gate (B56) and the west gate (Z43) the enclosure was crossed by nine water evacuation pipes of varying importance (supra). We believe that we have inventoried all of them in this section, so that if we rely on it, the enclosure as a whole could have been equipped with about fifty hydraulic evacuations, from the simple drain (in baked bricks) to the monumental Water-gates B65 and B17.

[1] On the question of elevations, it should also be considered that in the case of extremely wide walls such as those at Larsa, perhaps only a portion of the wall's footprint, on the exterior side, reached the maximum elevation of the structure.

[2] 680m minimum (B1-B36) and 1040m maximum (B56-Z37), the others at 715m (SW-Z43 gate), 870m (Z27-B1), 890m (B36-SW gate) and 965m (Z43-B56).

Most of them were probably original, others that were built during the successive remodeling of the hydraulic network (infra).

Finally, the enclosure was provided with proper military installations and equipment, the most important of which was the Chameau, already mentioned. Totally integrated into the ramparts, connected to the hydraulic network and even provided with its own reservoir (P8), this real castle covered an area of about 35,000m^2 (including its enclosure, with walls more than 15m wide). Its prospection delivered three bronze arrowheads (or spearheads) - the only elements of armament that we discovered on the site (Giraud, this volume) - and it is not very doubtful that it was the main barracks of the city, but perhaps not the only one. To the southwest of the site, two other, more modest fortified perimeters were discovered, also associated with the city wall and delimited by 15m wide mudbrick walls. Almost rectangular, they circumscribe a space of 5420 m^2 for the one located to the south (116 x 55m, at best), 4050 m^2 for the one to the north (90 x 45m). We still have no clue as to their precise function, but it is worth noting that the southern perimeter, perhaps associated with the probable southwest gate nearby, was connected to the hydraulic network and seems to have had an internal basin. The curtain wall itself, finally, was powerfully defended. Numerous bastions of varying dimensions, as we have seen, covered the wall, which never seem to have been integrated into a preconceived regular system, but distributed according to need. Other structures contributed to the protection of the wall. Certain sensitive points and long sections were protected by a glacis (supra), covering the uneven edges of the Tell, perhaps accompanied by ditches in places (e.g. in the area of the probable southwest gate), in addition to the numerous canals surrounding the city.

6. The hydraulic system (R. Vallet and L. Cez)

Our methodological approach and its limits

The data of the 2021 campaign presented above are the result of an interdisciplinary approach integrating the contributions of geophysics, photogrammetry, archeology and geoarchaeology. It consisted of a cross-analysis of spatial documentation with different scales and levels of resolution including the geophysical imagery, drone and satellite imagery and field observations. The plan of the city and the ancient hydraulic network as we have restored it will certainly evolve during future missions. There are indeed several limitations to our work of restitution, which mainly relate to natural dynamics interfering in the visibility of archaeological structures and more broadly on our understanding of the functioning of the hydraulic system.

i) Differential silting on the scale of the site, because the eminence of the Tell and the density of constructions and depressions in the topography favor the trapping of sediments transported by the wind, and the surrounding plain where sandy accumulations cover the archaeological structures[1].

The thorniest problem arising directly from wind processes is obviously that of topography of the site. As such, the mobile dunes are less of a problem than other forms of sand encroachment and

[1] At the same time, silting and in particular the sand cover at the foot of constructions, contributes to their conservation, at least part of their elevation, unlike deflation which tends to destroy the remains in elevation.

particularly the free sand that accumulates in all the depressions offered by the site[1], natural or man-made depressions resulting from looting (Mura 2020: 17-22), and which cover the base level of the site. Only the excavation of buildings can provide precise altitudinal data on the topography of the site, as we specified in the western sector.

ii) Runoff from modern wadis, which manifests mainly on the form of concentrated flows: temporary tributaries totally or partially scouring the depressions formed by the ancient canals in the landscape. In the case of sheet-runoff, vast areas are smoothed and whitish deposits resulting from water evaporation cover the archaeological structures. The geophysical image makes it possible to partly overcome the locally accumulated sand, but remains disturbed by the sometimes very dense traces of flow, as illustrated to the north of Water-gate B65 (see Fig. 7).

The combination of these erosion dynamics acting on the landscape at different time scales has consequences for the recognition of built remains, their number, size and type; but also on our understanding of the functional aspects of the hydraulic network that they form depending on whether they are connected to each other or not. As such, the existence of connections, the number, the point and the angle of connection are strategic elements that we need to know in order to assess the efficiency of the hydraulic circulation, its possible malfunctions or even the modifications made to the course of time. For all these reasons, the plan of the ancient water system of Larsa that we propose is not exhaustive, being even still very incomplete on large portions of the intra-urban and peri-urban territory, especially in the north-east quarter of the city and in the south-eastern part of our study area (see Fig. 5). There is no doubt that new discoveries will be made during the next missions.

Our lack of knowledge of the topography of the Larsa site at the time of its occupation prevents us from restoring the direction of the flows with certainty for some structures and the conditions of water circulation within the structures. Nevertheless, other indicators such as the morphology and the size of the works, the angles of connection between the structures make it possible to understand how the hydraulic system worked. In this perspective, the geophysical image provides interesting and precise data on the dimensions of the works, on the associated built structures such as earth-plains, and dykes. It provides indications on the way in which the hydraulic network fits into the urban structure of Larsa, and the relationships between canals and the rampart, the canals and the streets and other urban items.

In addition to this approach, the most urgent step is to determine the base level of the flows in the hydraulic structures thanks to transects in the deposits filling of the canals and basins. It is a major axis of the geoarchaeological approach applied to ancient hydraulic systems but still rarely implemented (e.g. Berger 2000, Purdue and Berger 2015, Cez to be published).

General characteristics of the hydraulic system of Larsa

The study area we covered by drone measure 3.3 km from north to south and 3.6 km from east to west, i.e. an area of approximately 1,200 ha where a photo-interpretation has been systematically carried out. Field prospecting concerned much smaller surfaces, mainly on the site itself, which

[1] One can indeed observe different shades for these sands, rather greyish for the oldest, more whitish when they are reworked by the passage of vehicles for example. Active dunes show the lightest hues.

occupies 200ha. In this area of investigations, the density of existing hydraulic structures within and around the city is truly striking. Several hundred canals have been identified, 124 of them have been numbered for description purposes, to which are added 16 basins of varying sizes. Let us recall that the study of the north-eastern and south-eastern sectors of the city, of the south-eastern and south-western sectors of the plain did not reveal many structures due to their excessive silting up (fields of coalescent barchans). Elsewhere and particularly to the west, the structures excavated in the ancient sub-surface are fairly well visible, as already noted (Geyer and Sanlaville 1996).

Our general plan outlines three distinct water supply sources for the city:

a) To the south-west, from the Euphrates River to the south of Uruk (or at the height of Uruk according to the old route chosen for the Euphrates), it is probably the oldest source but also the closest to the city. A set of canals, of which the two main ones, C49 and C50 are functionally linked to this source of supply. It has been known since the work of Geyer and Sanlaville (1996: 400) that at least C49, which is the most important, continued across the plain to Umm al Wawiya (WS 439, Adams and Nissen 1972: 54) and beyond[1].
b) To the north-west, two major canals, C88 and C38, already seen by Adams (1981: 163), originate in the Iturungal (Steinkeller 2001), or even perhaps directly in the Euphrates beyond (at least for C38).
c) Finally to the east, the large canal C1 coming from the Tigris (see below) was the main source of water supply for the city. It corresponds to the final state of the system, set up by Sin-iddinam (1849-1843 B.C.) and which lasted until until the abandonment of the city in the year 11 of Samsu-iluna (1738 B.C.).

We therefore have here several successive states of this hydraulic system, whose various elements did not all work together. The question is to know what modifications have been made during its successive phases of evolution; and what are the reasons. Wherever hydraulic structures are visible, especially major works, photo-interpretation makes it possible to establish their spatial relationships and establish a relative chronology of their operating phases.

The network in its final state

In its last configuration, the main supply of the city was based on the major canal C1, already described at the level of the plain from the northeast to the water-gate B65 and in its intramural course, that is to say the loop C1-C2-C3-C4 (see Fig. 9). Our hypothesis, developed above, is that the C1-C2 loop, with the help of the C5 lateral bypass canal which connects to C2, changes in size before the crossing of the water-gate B56 and the architectural characteristics of this water-gate, was intended to cross the few meters that had to separate the tell from its surrounding plain. If we admit that the current topography to the northwest of the city, at the P2 basin level, is close to the old one, this indeed means that there was a difference of 2 to 3m between them. The second loop is the one formed by the C2 canal in its course north of the Tell along the rampart. The choice of this route could be explained by the need to allow it to rise in altitude while maintaining a gentle

[1] In this sector, the dunes masked the plain and therefore the channels located between Larsa and Umm al Wawiya when R. Mc Adams carried out the exploration of Uruk. Archaios' observations confirm that the channel through Umm al Wawiya is C49 (Giraud, Mura et al. 2022, fig. 70, p. 118).

slope, even if the contour lines do not show it since the canal is located between 5m and 6m of average altitude, until the bridge B25 beyond which it becomes C3.

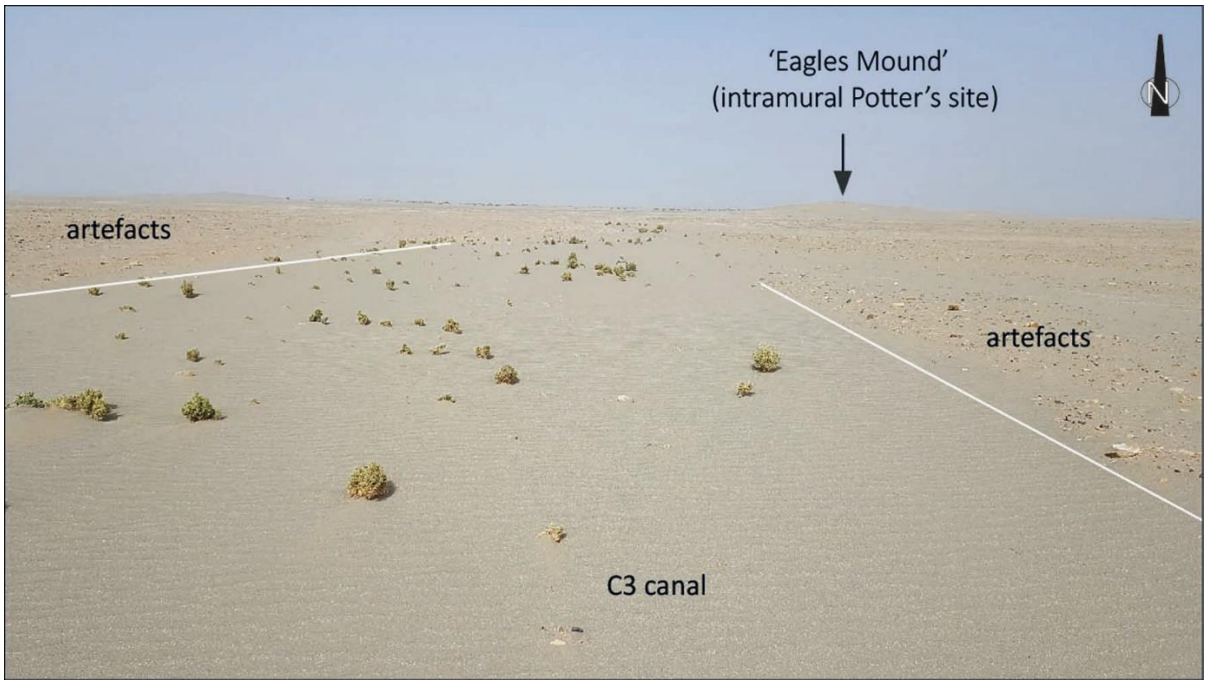

***Fig. 19** – The canal C3 seen looking north as a large depression filled with sand and a few shrubs (Photo L. Cez, November 2021).*

The C3 canal or 'Grand Canal' is the main artery in this last phase of the intramural network. It has a length of 920m between B25 to its bend to the southeast, in the centre of the site. Between these two points, the width of the canal, 20 to 22m, increases very markedly after C2 passes through a curve and decreases even more when it is relieved by C4, this canal being only approximately 5m wide from the geophysical image to the south (Fig. 19).

The C3 canal brings water to the center of the city and redistributes it from one side to the other, almost all over the city. Moreover, a landing stage could have been built on the plain located to the west (supra), making this canal an important artery for goods circulation in the city. Since the south of the city does not seem to be supplied thanks to it, but it may reflect our still incomplete state of knowledge. The canal is organized in sections, 4 in number a priori, of unequal length: 195m, 115m, 190m and 390m, from north to south, separated by earth levees about ten meters wide. These levees had to correspond to dykes built leaving passages of the order of 4m on average. We can interpret them firstly as crossing points, probably thanks to a system of movable bridges, because it appears very clearly that some streets connected to these points of the canal: R3 and R5, which we can clearly see the extension to the west. Positioned at fairly regular intervals, they made it possible to connect the eastern and western sides of the city without having to join the existing bridges supported by fired brick piers: B25 to the very north and B69 to the very south of the canal, a structure built up by Sin-iddinam (being excavated, Zingarello, Bachelot and Hsony, this volume). Two other streets, R2 to the north and R4 to the south were connected to these bridges[1].

[1] The creation of the C1-C4 system most likely led to a reorganization of the road network, at least in part. The distance separating the small transverse dykes on the C3 canal, to which the streets are connected, varies from simple to triple, probably because old streets have been preserved.

These levees were also intended to regulate the flow of water upstream of the water branching points with C7, C8, C9 to the west and C10 and probably others to the east. It should be noted that a canal departure to the very north of the C3 canal, after the bridge B25, has been identified towards the east but without being able to continue it. These points of water regulation in the canal also make it possible to maintain it, the cleaning of the bottom deposits being essential to avoid the raising of the flow level.

Apart from C4, we could not identify any other offshoots at this southern end of C3. C4 canal flowed for 800m, until it joined, outside the city, the peripheral canal C60, derived from C1 730m further north. Although it is more modest in size, the function of C4 is crucial because it drains the canal C3 and feeds the south-east and south-west sector of the city via other smaller canals, such as C123 and C122. The canal C123 (see Fig. 10) probably supplied water to the large basin P5 south of the Ebabbar. This secondary network essentially remains to be discovered.

The intramural network

Excepted canals still mentioned, the hydraulic network to the north was structured by the C10 canal to the east, by the C9 canal to the west and further northeast, the large basin P2. In the general system, the canal C10 makes a direct junction between C3 and C2 and re-injects its flow into the large loop from C1 to C4. 6m wide near the Grand Canal and 4m elsewhere, he probably had a role similar to that of the canal C4, but feeding the eastern districts of the city. However, only one diversion has been established with certainty, from C10 northbound along R6 Street.

From the Grand Canal to the north-west sector, the C9 canal directly supplies the 'official' building sector of temples and palaces, the one that includes the architectural complexes of a political and religious nature; and beyond to the north, the basin P2 by the lateral canal C15. The C9 work being largely covered by runoff of modern wadis, it could be restored by crossing the geophysical image for its northern section, the aerial photograph of 1973 for its central section and the drone image for its southern section. It was between 6m and 7m wide, over 665m almost in a straight line from C3 to P1. It passed 50m from the palace of Nur Adad, then, further north, was laid out with quays, themselves lined with buildings. At this level is also visible a small diversion to the west, C96, which fed a small basin, P3, of about 40 x 30m, i.e. 1200 m^2 of water in the heart of the official area.

The P2 basin was, by far, the most imposing structure of the intramural system. It has probably been extended over time because several parts are characterized by different hues. It extended over 230 x 130m, or 26,000m^2, but its north-western angle is not visible, just like a possible connection with C19. Further west, canals C16 and C19 intrigue with a hairpin layout, quite short (260m at best) and yet particularly wide (25m). One is tempted to see the very partial remains of a loop that would have been the western counterpart of the great loop of the eastern sector. As it stands, their shape and size resemble reservoirs more than canals. They could have been parts of an ancient phase of the water network and have worked in the opposite direction (see infra).

The primary agricultural function of this large and shallow basin P2 has already been highlighted. It is based on physical connections with agricultural plots further south-west and connected by a network of small canals (C20, C22) and pipes. Excepted for irrigation use, it was the most important water reserve of the city, although its location is not central. This point shows above all

an implantation according to the available space and its flatness. The presence of agricultural plots reinforces this hypothesis, as does the archaeological furniture. On the other hand, a port function seems to us to be excluded, or maybe occasionally, because of the difficulty of access to the basin. Due to its location to the west of the city, the path to reach it from Water-gate B65 in particular is long. Moreover, Larsa had several landing places, intramural in the center of the canal C9 for the official area and another one located north along C3, and to the outskirts of the city to the south, which is a real port easily accessible (infra).

To the south, the water supply is differently organized, based on two major works: C26 canal to the east and the probable canal to the west, i.e. C27 and the other segments identified on either side of the current wadi bed (supra, 4. The South Sector). Taking into account the route of these structures, we deduce that the P5 basin plays a crucial role in this part of the city as a central point of water redistribution, being connected to other canals to the north and with its large capacity of storage of 5500 m^2. Other small basins existed in this sector, like P6, which must have been fed by runoff of small wadis. This system of basins, integrated to the intramural hydraulic system or having an autonomous water supply, even episodic, was indeed adapted to sectors with a steeper topography. The presence of numerous potters' kilns (see Fig. 18), particularly to the west of P6 and along the canal C27, is probably at the origin of this "maximalist" water management, involving the recovery of all available water resources. The small basins P16 and P17 operate differently, being supplied by the C26 canal, but they fall under the same logic of water exploitation, the water being stored for a certain period by closing the downstream evacuation drain. Again, these basins are located near potters' kilns. Apart from the artisanal district of the southern zone, this mode of management could be applied to the great residential district in the northeast, where the relief is also more marked, and which was also to contain storage basins. The C26 canal was therefore an important segment of the hydraulic system for the south of the city but also beyond the city walls, as it continues far into the surrounding countryside, beyond the major peri-urban canals C55-57.

The peri-urban network to the west of the city and the phasing of the system

The first observation that can be made about the hydraulic network around the city, in a first overall approach, is that of the density of canals that it covers. On a finer scale, the overlaps between these structures show that they were not all contemporary (see the overall plan: Fig. 2). Structures belonging to an older network are generally indicated by a visible trace, thanks to the surface stripping, but more of a pale hue. They are distinguished from the traces left by the more recent network, which developed thereafter and lasted until its abandonment. There are therefore two major historical phases of development of the hydraulic system: the old one whose chronological limits we do not know but which was certainly dated from the beginning of the 2nd millennium (prior to the reign of Sin-iddinam, 1849-1843 B.C.), like the overwhelming majority of the remains visible on the surface. It is even possible that some of the oldest identifiable elements date back to the end of the 3rd millennium. It can be assumed as a working hypothesis that the most ancient visible state of the network dates, at the latest, from the re-urbanization and fortification of the site by Gungunum (1932-1906 B.C.), the construction of ramparts by Gungunum having had to take into account, at least partly, the already existing network.

Phase 1

The city was originally fed from the west, a sector having an abundance of large major canals. The C88-C37 canals (15m wide each), associated with the large C49 canal, to the south, and the central (and southern) part of C36 canal represent the oldest perceptible state of the system. The C88-C37 system brought water as close as possible to the city, at the level of the C19 Water-gate. For this reason, the C19-C16 intramural subsystem must have corresponded to an ancient state of the hydraulic network, with a functioning in the opposite direction to that which has been explained, that is receiving water from the west and not discharging water to the west, which is valid for the most recent and final phase of the system. This point seems all the more likely since the large residences B48-49, well associated with other structures (a probable granary, the causeway R12 crossing the canals, cf. supra) to the irrigation canals along which they are arranged, could be precisely dated to the reigns of Gungunum and Abi-sare (Charpin and Jacquet, this volume). The compatibility of the layouts between the large canals and the rampart also suggests that phase 1 dates well from the reign of Gungunum.

Phase 2

Large-scale works have profoundly remodelled this first system, which concerns the ends of the canals (not their routes). The terminal part of the canal C88 and most of the C37 canal, its southern ends being probably remained in use, were abandoned in favour another watercourse of a huge redistributor basin, P9 of 30m to 40m wide (and over 240m long). Given its north-west/south-east orientation, its great width of about thirty meters on average, this very long rectangular basin could originally have been the end of a natural channel. Several palaeochannels in this sector intersect the supply canal of the city. The Corona image shows that the basin P9 is fed by a canal that runs through the plain in a straight line toward the north-west, to the canal C88 and beyond, to the canal 38. The function of the P9 basin was to redistribute water on all the northern side of the city thanks to the adduction canal C95, of generally 4m wide; as well as on western part of the city thanks to the canal C39 of 15m wide.

Initially (Phase 2a), C39 was to extend in a straight line to the south over a fairly short distance, until reaching C36 preserved from the previous system. This first phase of work was therefore to allow the water supply of the lands located to the north-west and north of the city. In a second step (Phase 2b), the course of C39 is deviated, by a 90° bend, to extend it towards the south-west, probably up to C49, like C37 previously but through a larger territory. The canal C88 was connected to C39 by a new section, offset from its original layout and a new canal, C45, with a somewhat winding route, ensured the connection with the network to the south-west part of the city. These developments of the second phase of hydraulic development therefore mainly benefited the western part. Subsequently, the system of this sector was further modified (Phase 3).

Phase 3

The capacity to supply the city to the west has been reinforced with the construction of a new canal, C38, about 200m west of C88, little less wide than it, i.e. 10m wide against 15m for C88. On its way, it intersects C39 and completely erasing C45 (Fig. 20). The canal C38 originates northwest in Iturungal or further still directly in the Euphrates River veering towards the west, upstream of Uruk. South-west of the city, the multiplication of canals running towards the Euphrates River, still mentioned, may date from this period, like the duplication between C49 and C50 canals. It

should be noted that the new canals have not replaced the old ones, but have been added to them, as shown by their interconnections, clearly visible for instance between C49 and C50.

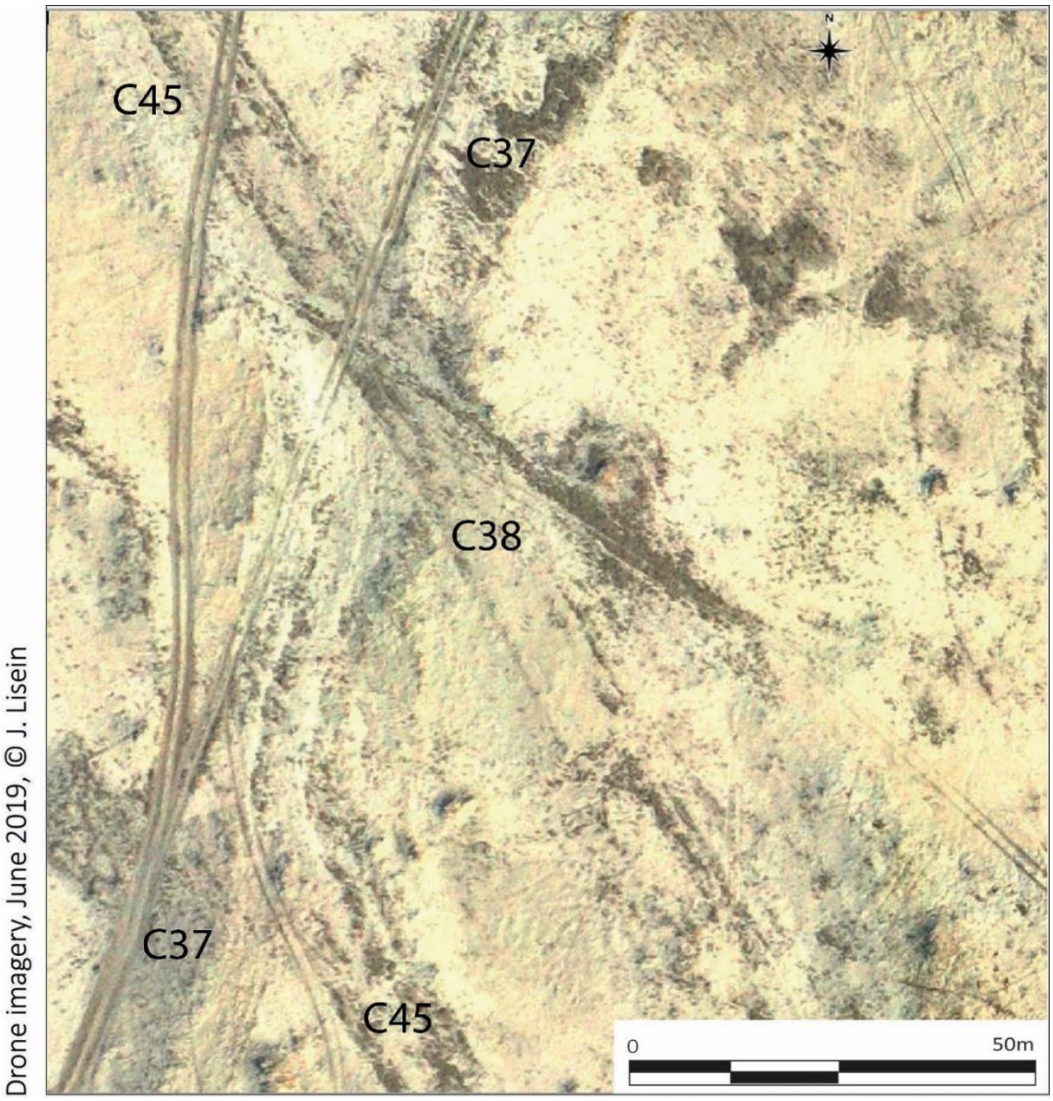

***Fig. 20** – The superposition of three generations of canals C37, C45 and C38 to the west of the city.*

A final major reorganization concerns the western area of the city. A new link was created to the south, between C39 and C44, the C121 canal, replacing the southern part of the C38 canal. Some sections of the C38 were nevertheless retained to be transformed into ponds, such as those visible in front of the western gate Z43 of the city. The creation of canal 121 seems to be linked to the cultivation of land to the west of canal C39. This can be associated with the creation of a basin on C39, perhaps to redistribute water, and a canal C114, which is an extension of C121 to the west. Immediately south of the western gate Z43, the connection from C121 to C44 was subject to visible modifications, the reasons for which still elude us. The straight line of C121 allowed it to reuse that of C38 for a short stretch, but it was then connected to C44 by forming a very pronounced elbow in front of the city walls, at the level of the exit of canal C27.

Phase 4

How to integrate the C1-C4 system, with a city water supply from the Tigris in the northeast, in this phasing of the hydraulic system? This part of the network seems to us to be incompatible, on the operational level, with works of improvement and development of the network, which based on the waters of the Euphrates. It seems to us that it can only be after the improvements made during phases 2 and 3, thus constituting a new distinct phase of hydraulic works (Phase 4).

If we attribute Phase 1 to the Gungunum period and Phase 4 to that of Sin-iddinam, the great works of Phase 2 could be those of Abi-sare (1905-1895 B.C.) completed by Sumu-El (1894-1866 B.C.) around 1877 B.C., and those of Phase 3 correspond to the efforts of Nur-Adad (1865-1850 B.C.) to continue to ensure the supply from the Euphrates. The changes around C121 are more difficult to situate in time. In theory, they could have taken place at any time after Phase 3. But there is very little chance that they were contemporaneous with phases 3 and 4, especially considering the short duration of the reign of Sin-iddinam. The most probable is that they are later, thus constituting a Phase 5, which we would gladly place under the reign of Rim-Sin (1822-1763 B.C.), who we also know carried out numerous hydraulic works (Charpin 2002, with references). Future fieldwork should focus on collecting data to confirm, or rectify, the historical sequence that we propose.

The southern network and the port of the city

It seems that the network to the south of the city has been more stable over time. The large peripheral canal C44, generally 7/8m wide, running along the rampart at a distance of 50 to 80m depending on the location, is connected to all the successive large canals coming from the north-west (C36, C38, C121). Long and generally east-west canals coming from the west (from C50) or from the north-east (C57, C55) cross the southern zone and a very dense network of transverse canals, of varying size, subdivides the land into more or less regular geometric plots, clearly devoted to agriculture.

In the center of the sector, were established along canals (C66, C44, C54) a series of fairly large mud brick constructions (B70-71-72-73), large consumers of water judging by the specific adductions from which they benefited (C62, C77) and the many small basins associated with them. We do not have, for the moment, data concerning the function of these buildings but we can consider that they were linked to agricultural activities given their location in the heart of an agricultural area, or possibly, of a craft activity water-consuming and polluting, which would explain their rejection far from the city.

The Port P7

The largest hydraulic structure discovered in this sector, and on the scale of our entire study area, is the city port (P7), located at its southern end, on either side of the ramparts (Fig. 17). The outer basin of the harbor was about 350 x 75m (27,825m2) and follows the contour of the enclosure, protected by a powerful 17m wide dyke. Access to the internal basin was from the west, by two passages through the rampart, about 25m apart from each other, about 4m wide, and probably corresponding to an entry/exit system (Fig. 21). From the south, external access to the port was via the C56 canal of 10m wide, with perhaps an identical double-passage system. The inner harbor is more difficult to delimit on the basis of orthophotos alone, because of the important surface deposits (aeolian and carried by many recent wadis) in this area. It certainly included a large dock (canal), 10m wide, running along the inner side of the rampart, protected by a narrow dyke (about 5m), over 150m long, from the western entrance of the harbor to B57. On the western part of its route, the main dock was perhaps associated with a basin, quite modest (perhaps of about 3000m2), from which several secondary docks started. The current design of these last elements is

hypothetical, and must be confirmed by further work (geophysics in particular), but the existence of internal elements associated with the main dock is not in doubt.

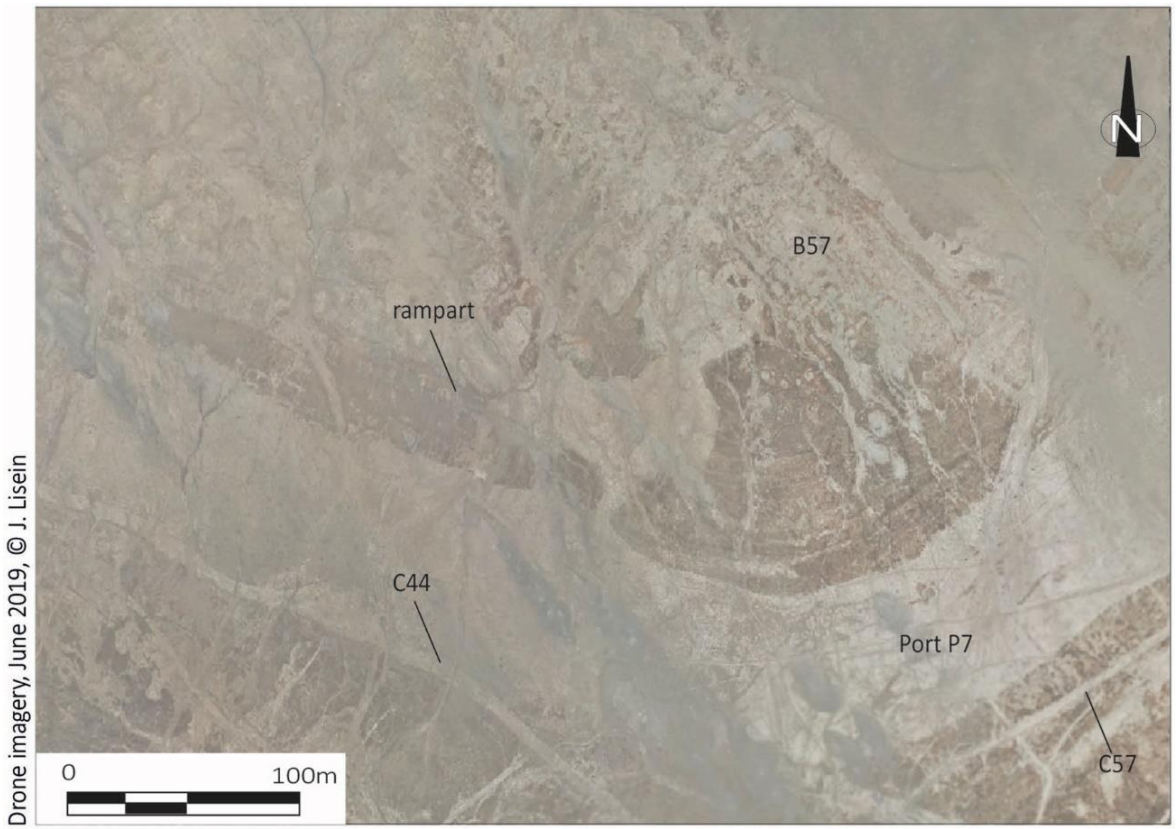

***Fig. 21** – The port of Larsa and its relation with the rampart to the south.*

This discovery sheds light on the function of the remains already known around: in 2019, revisiting building B57, we argued, based on the extreme partitioning of its plan, that this vast rectangular building of 110 x 50m, or 5500m², was probably devoted to storage (Vallet and Suire 2020: 58). We can now say that this is the warehouse of the city port. It should be noted that the building delivered two bricks inscribed with the name of King Sin-iddinam (Huot, Rougeulle and Suire 1989: 50). It is therefore part of the hydraulic equipment program of this sovereign, who, if not built the port, at least provided it with a new warehouse[1] (Fig. 22). Other constructions were linked to the port. West of B57, we know of a square building of 30 x 30m (discovered in 2019), but also a small building B58, about 10/15m north of the internal harbour. It has a single room (7 x 3.3m), but with walls 2.1m wide (Huot, Rougeulle and Suire 1989: 50), which seems to correspond to a rectangular tower dedicated to monitoring access to the inner port[2], because there is no doubt that the security of the port must have been a major concern. A huge bastion, 45m long by 25m of projection (to the east, only 12m to the west due to the offset of the rampart's layout), constituting a sort of redoubt, watched over the opposite end of the outer basin. The construction was bordered to the east by a pipeline crossing the rampart, perhaps arranged in a narrow postern giving land access to the inner port and its warehouse. This pipeline, which can be followed for more than 275m inside the city, drained the waters of the district, from B57 in particular, and was connected to the main dock of the internal harbour. Outside the city, it flowed into a small canal of less than 3m wide running along the outer face of the rampart at a distance of a few meters and connecting

[1] Larsa was probably long provided with port equipment. It is quite possible that Sin-iddinam built the port - replacing an older facility, or that at least expansion work has been carried out. We do not have the data to tell.

[2] Huot, Rougeulle and Suire (1989: 50) already assumed that the construction responded to a « specific function ».

canal C26 to the outer basin of the port. The port was very well connected to the inner as well as outer hydraulic networks, no less than 8 connections for the outdoor pool have been recognized: 4 from C44 to the southwest, two from C57 to the southeast, one from C26 and C56, so that its supply was constant.

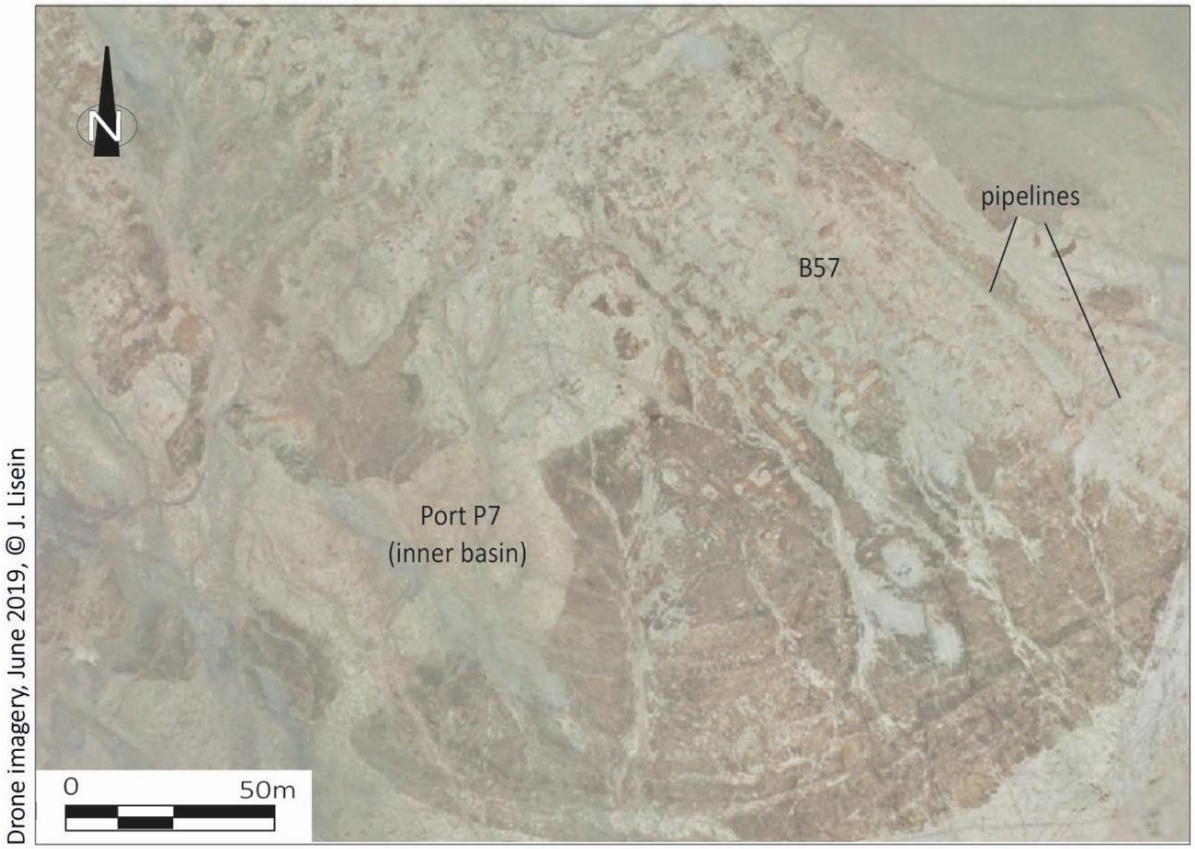

Fig. 22 *– The interior port and its warehouse B57.*

The network to the north and east of the city

As we have already seen, the canal C95 structured the northwest part of the plain surrounding the city since phase 2 of our historical periodization. Originated from the P9 basin to the west, this canal is joined by other canals from the north, C108 and C89, and continues east before heading northeast. During phase 4, a water intake was built on canal C1, the main water supply to the west of this period, about 1.2km above the Water-gate B56 (Fig. 23). Canal C94, 6 to 7m large, diverted water from C1 toward west in straight line, intersecting C9, until joining C95 where the trajectory of this canal marks a turn in the direction of the northeast. At this point of intersection, water of C94 was recovered by the smaller canal C92 and fed large narrow basins arranged at the ends of the canals C90 and C91 and between them (Fig. 24). All of these canals coming from the north, some very straight, others for a part more sinuous, are connected by C92 at their termination but lateral derivations between them can also be guessed further north. North of the city, two large areas of water have been identified by archaeological prospecting and interpreted as reservoirs (Giraud et al. 2022: 111, fig. 66) (Fig. 25). Their very elongated shape and their location between two old active river bands (Fig. 26) to the west and east suggest that these hydraulic structures may have once been attached to them as palaeochannels or wetlands, especially for the easternmost one. One can observe that these gigantic water reservoirs located about 1.5 km north of the city, connected to each other, were fed by a series of canals diverting water mainly from palaeochannels of the western river strip (designated as “1” in the figure 25).

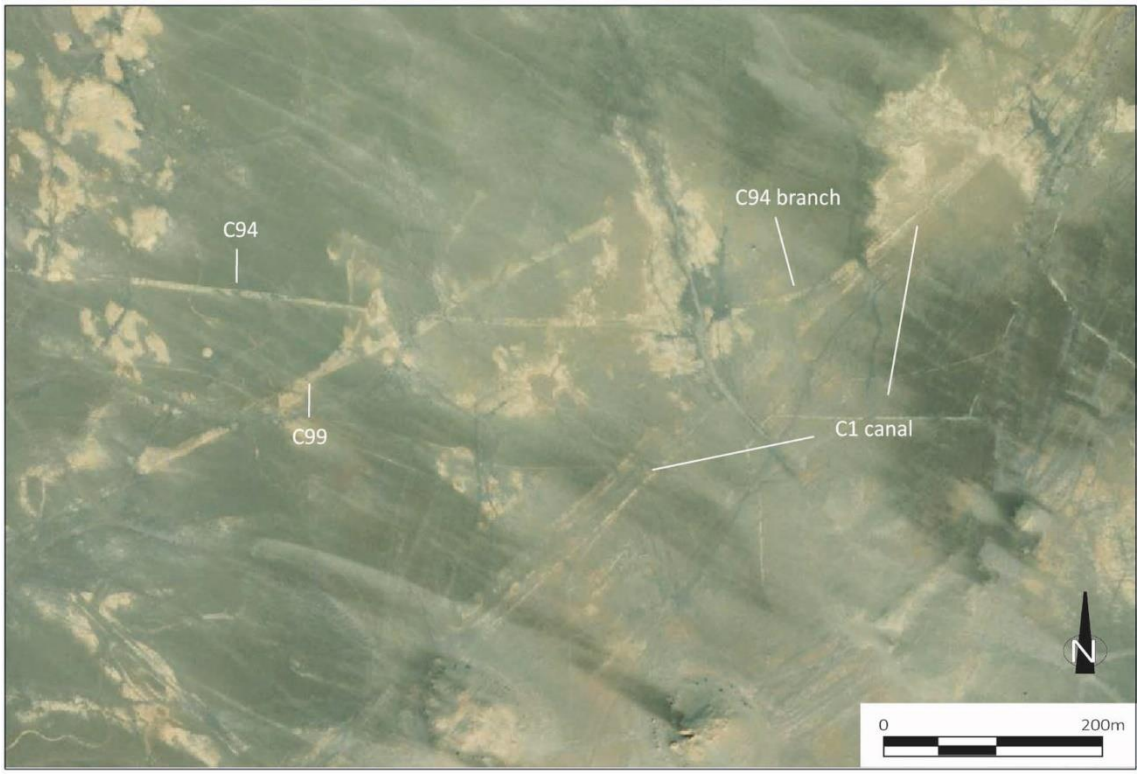

***Fig. 23** – The starting point of the canal C94 on the main C1 feeder canal and its westward trajectory.*

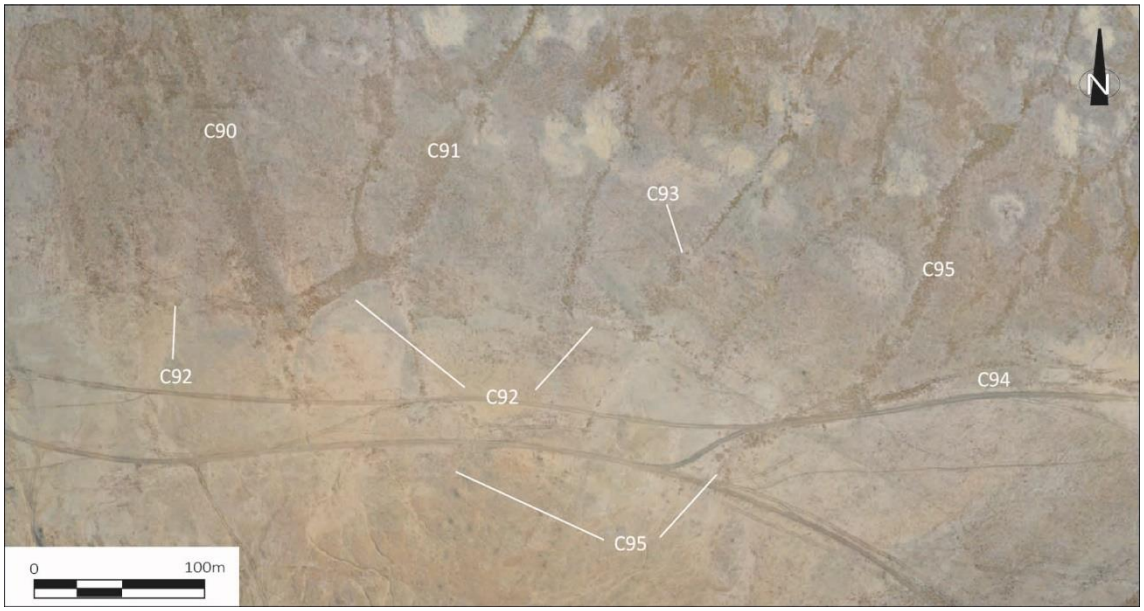

***Fig. 24** – The canal's system to the north of the city and the C95-C94 intersection.*

The large size of these structures with geometric offsets probably results from successive extensions over time. Part of the field investigations during the next mission will aim to identify the structure of these reservoirs, especially their massive external limit, and the connections with the hydraulic network of the city.

This being so, we clearly see that they were linked to the city of Larsa, in particular by the canal C89, a 4 to 5m wide watercourse originating at the northern ends of the westernmost reservoir. Other canals to the west and to the east should be connected to these structures (some sections are shown with white arrows on the figure 26). To the west, C90 was itself connected to C89.

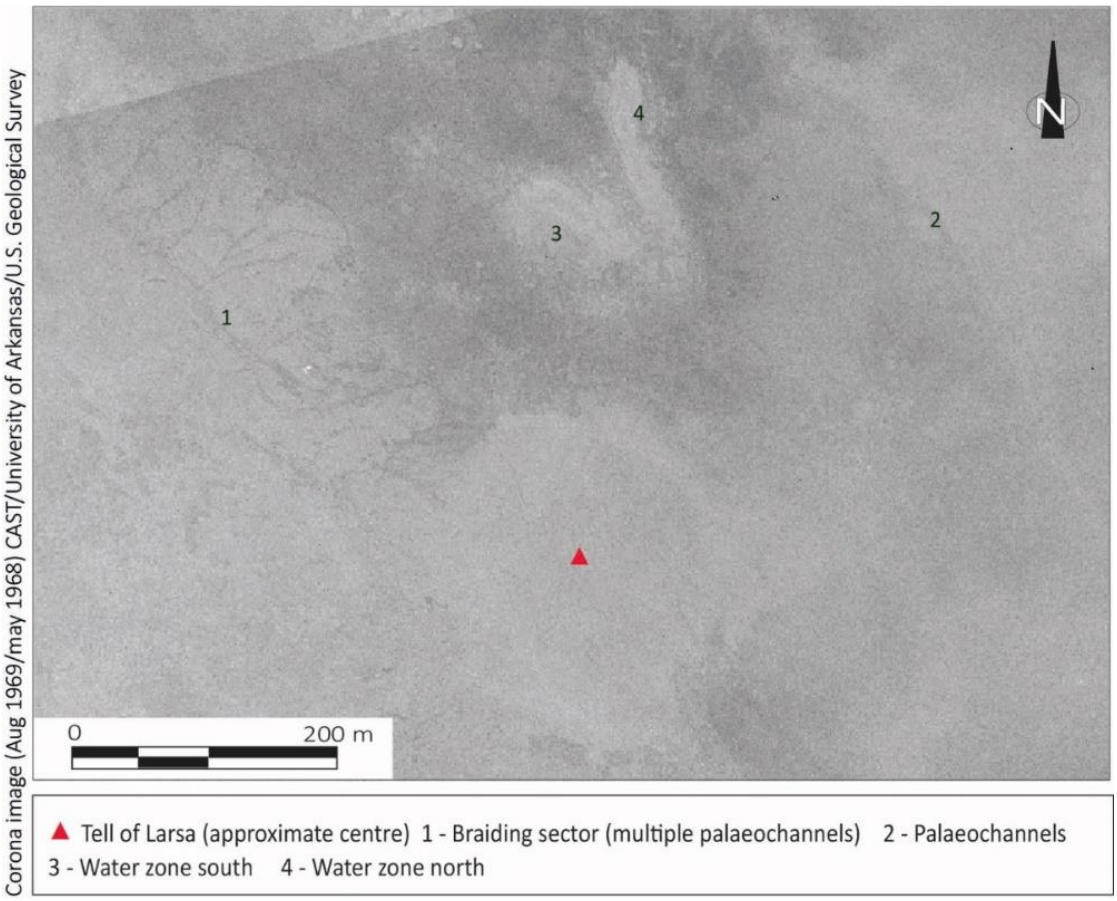

Fig. 25 *– Water zones to the north of the city.*

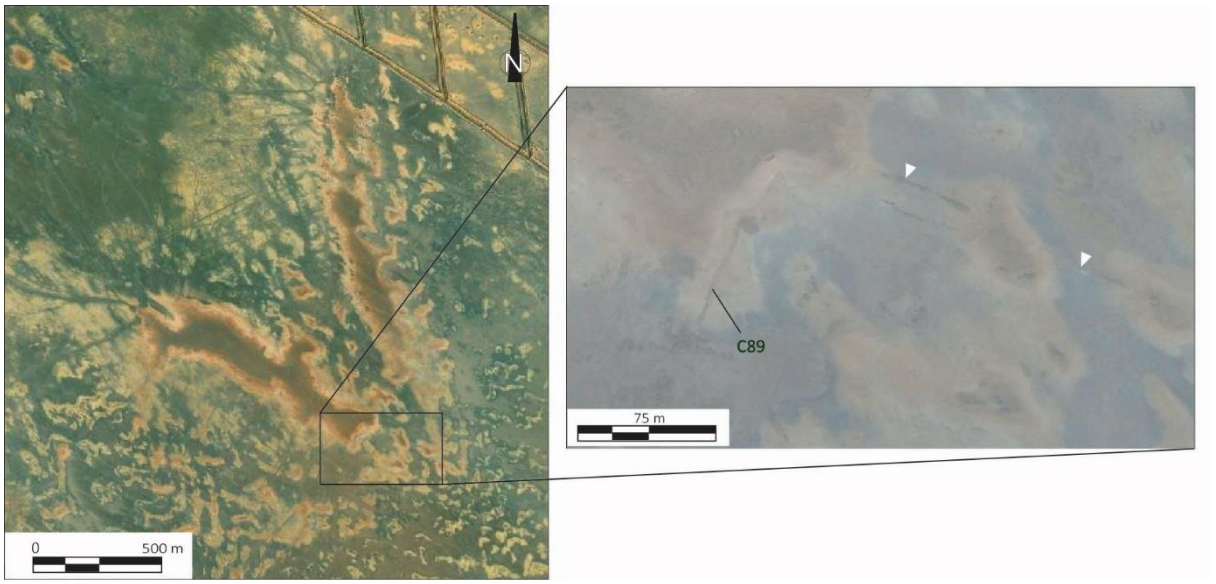

Fig. 26 *– The canal C89 and its connection to the south-western water zone.*

Canal C92 extends to the west after intersecting C89, by collecting other canals from the north and, heading further north, adopts a course almost parallel to the P9 basin from which it is a little less than 70m away, before joining it at its northeast corner. Its course is visible beyond in the plain towards the northwest. This functional explanation, which seems to us the most probable, implies that the water circulation here was designed to make a loop[1]. The flow of C95 coming from the basin P9 the west should be diverted partly to C107, i.e. before meeting point with C94. As in the south of the city, this sector was intensely cultivated, although wind erosion does not give as

[1] This system circular needs to be confirmed, because it cannot be ruled out, at this stage, that C92 was operating in the other direction, i.e. from P9 towards the east.

complete a picture as in the south. The construction of C94 met the water needs for agriculture and, consequently, to a densification of the network in the plain. With the phase 4, new hydraulic structures were created, canals C1-C2, with many secondary canals derived from them. One can count seven from C2, crossing the rampart, over 1km from C29 to C87, and 8 derived from C1, between C29 and C100. New developments of this phase have benefited the northeast zone located between C1 and C2. The density of the cultivated plots and the presence of two square buildings, most likely farms, in the heart of the sector, attest to an unprecedented agricultural development between the two major canals. In addition, many water reservoirs were there: there are 8 basins, of very variable size.

The eastern sector, a very large part of which is located south of C1, is the least well documented due to wind processes (see supra, 1. The East Sector). The construction of the C1 canal led to a remodelling of the original network with five canals that are derived from it. Among them, C60 had a particularly important role since it collected the waters of the internal canal C4 further south, and ensured the water supply of the Chameau, the main fortress of the city, via a dedicated storage basin P8, of 65 x 45m, or 2900m^2. From the north-eastern side of the basin, the canal C57 extends the water supply along the rampart south to the port at the southern end of the city. In the north-east, the small Tells known as the 'Mahmudiyat' (WS443 of the Uruk prospecting, which saw only four out of eight in total - three being immediately east of the area we prospected), illustrates the insertion of small peripheral occupations into the hydraulic system. It is clear that the hydraulic network extends without interruption throughout the peri-urban territory. Located near C1, these small establishments were supplied by water intakes close to C1, on either side of Z16, long canals connected each of them to the peri-urban network, such as C83, C82, C84, C109, while others interconnected them. In the case of Z16, established near C1, a large building dominates it, which perhaps had a function in relation to it[1]. One of the peculiarities of the network to the east is the integration into the network of natural channels, as in the north of the city but here only partially channelled. Here, a north-south channel in particular seems to be used as a canalized segment.

Conclusion

Our knowledge of the organization of the city of Larsa and its ancient hydraulic system has made great strides since the recent resumption of field works. Data acquired during the 2019 and 2021 campaigns are considerable, consisting in high-resolution images of the site and its surroundings, i.e. geophysical image, satellite imagery and ortho-photos. The cross-analysis of this data and the observations on the field made it possible to establish the plan of the ramparts of the city and the hydraulic structures of the intramural and peri-urban network. Our efforts focused on identifying the old hydraulic infrastructures (type, spatial extension, technical characteristics) and the connections that may have existed between them. Beyond this photo-interpretation approach, it is a functional analysis that we have developed by striving to take into account the constraints of water circulation (size, orientation, branching angle). The interest of this work is therefore to bring elements of reflection on the old topography of the site, which is a determining parameter of the operating of this complex hydraulic system.

[1] Z17 a little further east is also capped by a building, both associated with Isin-Larsa material (Huot, Rougeulle and Suire 1989: 38), then later transformed in the course of the 2nd millennium into brick factories (mission survey).

The hydraulic system of Larsa we have restored is dense, based on a large number of major and secondary canals, which are articulated around points of redistribution starting from the central work of the 'Grand canal' (C3). Some areas of the city are still poorly documented mainly due to aeolian deposits, which hide the fossil traces: the northeast quarter and the southern zone in particular. The progress of the last 2021 geomagnetic prospecting campaign is an asset for future research since the signature of main urban structures is now known like that of the mud brick city wall, gates and water-gates, bridges, streets, major canals as well as pipelines. This will allow us to study "à la carte" the urbanism and structure of a given sector. The impressive density of canals within the city and in the surrounding plain and the overlaps observable between them locally, show that it is the result of densification over time. It took place during four main periods. The initial system (phase 1), contemporary of the reign of Gungunum (1932-1906 B.C.), based on C88-C37 major canals and brought the water to the site from the west, connected to the C19 Water-gate and supplying water the western part of the city by the C19-C16 internal network branches. The main development of the phases 2, probably under Abi-sare (1905-1895 B.C.) and Sumu-El (1894-1866 B.C.), is the extension of this system to a larger territory thanks to the large P9 basin redistributing water to the west, by C39. The densification of the network in the west (C38) and south (C49-C50) and the reorganization of the western zone take place during the phase 3, which can be attributed to Nur-Adad (1865-1850 B.C.). The modifications of phase 4, under Sin-iddinam (1849-1843 B.C.), are of another magnitude since the system integrates a new supply from the northeast from the Tigris (C1) and the internal supply of the city is completely reconfigured with the C1-C4 subsystem. Although they took place during a very short reign, these changes are considerable and gave the water network and to the city itself its final appearance. It is undeniable that certain structures attached to the rampart are linked to these modifications to the network of canals, particularly to the east, such as the Water-gate B65 and the East (Parrot) gate B1, the restructuring of the enclosure and the articulation of the street spaces.

What makes the real complexity of this system is that the water supply of the city and the surrounding countryside responded to domestic, artisanal (ceramic production) and agricultural (irrigation) uses, to which must be added navigation. The type, size, location but also technical and architectural characteristics of hydraulic works reflect these specific uses but also the topographical constraints, for example in the southern sector. Note also that a large number of structures, but not the most massive, allow the evacuation of urban water. All of these data show a mode of water management aimed at making the best use of available water resources, by combining direct withdrawals from the Euphrates and Tigris rivers and runoff from intermittent streams. This is the vocation of the many basins of the intramural city, including the huge reserve of P1 basin, to compensate for the unequal annual distribution of water resources, all the more so if the needs increase over time.

The hydraulic system still needs to be completed and studied in detail sector by sector, with support of geophysical prospecting in particular. As it stands, it raises many questions about the concrete conditions of its operation and maintenance. The geoarchaeological study of the structures and specifically of their sedimentary filling should provide a new panel of data on these aspects.

IV – Trench 'PZ' across the Grand canal of Larsa

Melania Zingarello, Luc Bachelot and Mustafa Fadel Hsony

***Fig. 1** – Aerial view of Trench PZ.*

One of the aims of the 2021 campaign was the study of the network of hydraulic canals through the city (Vallet, Cez and Darras, this volume), traces of which were spotted as early as the 1980s on aerial photographs and confirmed by geophysics in 2019 (Darras 2020). One of these canals, the main canal of the city (now labelled C3), oriented north-south, flowed a few meters from the eastern corner of the monumental complex of the ziggurat. On its whole course, the estimated width of this canal is 20/22m, but seems to narrows to about 15 m near the ziggurat. This narrowing indicates the possible presence of a particular structure intended to reinforce its banks and possibly to build a bridge. The geophysical survey conducted during the October 2019 campaign provided a clear picture of the presence of two symmetric architectural structures (strongly magnetic anomalies) corresponding to the possible bridge (B69, cf. fig. 4, p. 9). A 10x10m excavation square was therefore set up in the east part of the canal, around the eastern structures, for determining their contours, construction method and functions. Four architectural levels, 1-4 from top to bottom, have been recognized so far (Fig. 1 and 2).

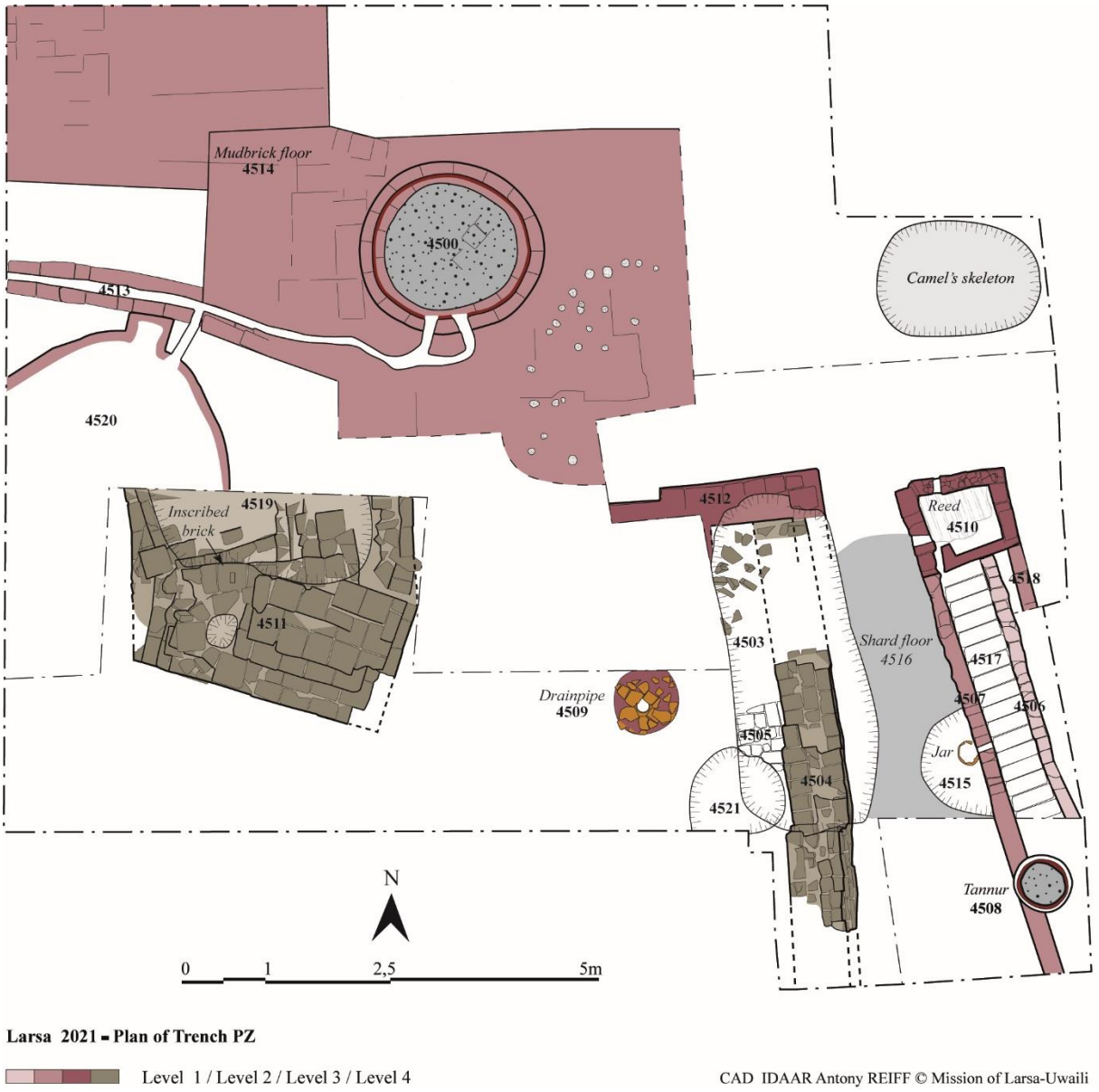

***Fig. 2** – Trench PZ, plan of excavation.*

The Isin-Larsa/Old Babylonian period (level 4) (L. Bachelot and M. F. Hsony)

Located inside the canal bed, a construction (4511) made of baked bricks (33x33x9cm) was excavated to a depth of nearly one meter (8 layers of bricks), its base not yet having been reached. Measuring 3.50m in the east-west direction, its size in the north-south direction remains unknown for the moment (Fig.3). Its upper part has been badly disturbed by an ancient pit (4519), predating the last level of Kassite occupation, and by structures from this latter period.

Nevertheless, some of the lower brick courses that are still in place have been reached and it has been possible to ascertain that they follow a different orientation from those of the southern part, according to an angle of about 30°. If the future exposure of this structure towards the north confirms this double orientation, its trapezoidal shape would be well suited to the function of a bridge pier, by facing a more hydrodynamic angular shape to the water current than a strictly rectilinear mass, perpendicular to the flow of the channel.

It should nevertheless be worthy to point out that all of the brick courses unearthed were bonded with clay and not with bitumen, as expected in Mesopotamian context, particularly in structures exposed to water. Moreover, the masonry of the massif presented a strong slope going up towards

the west, i. e. the center of the canal, of about 10 cm per metre. This structure was precisely dated thanks to a baked brick stamped (Fig.3, right) with the name of King Sin-Iddinnam (1849-1843 B.C.) of Larsa (Charpin and Jacquet, this volume). The fill layer in which the structure was located contained ceramic material from the late Old-Babylonian period (Costanza, this volume), a layer directly sealed by the Kassite soils of later reoccupations.

Fig. 3 *– Baked brick pier 4511 being excavated, from the south (left) and west (right), with the inscribed brick of King Sin-iddinam in situ (right of the scale).*

In the eastern part of the excavated area a north-south oriented wall (4504) (Figs. 4-5), preserved over a length of 3.50m and interrupted by a looter's pit (4503, beyond which the wall continues) in its northern part and 0.70m wide, is made of 5 courses of rectangular baked bricks (20x30cm) laid out in stretchers and headers. It should be noted that it slopes westwards, i.e. towards the canal. Immediately west of this wall, a small pit (4521) and a fragment of brick floor (4505) were found in the Old-Babylonian fill.

Fig. 4 *– Wall 4504 from the north.*

***Fig. 5** – Wall 4504 on the foreground, from the west. On the background, the structures of the Kassite phase: the drainage floor 4516 and installation 4510. Drain pipe 4509 is visible to the bottom left.*

The Kassite-period production area (levels 3-1) (M. Zingarello)

Like the structure 4511, the eastern edge of the canal was covered by a Kassite-period working area consisting of craft installations devoted to different steps of the "chaîne-opératoire" of the pottery production. Three main levels of the workshop have been identified, labelled 1 to 3 from top to the bottom (cf. Fig. 2).

Level 3

The earliest Kassite level has only been explored in the east sector of the trench. It consists of the first stage of what might be a decantation basin for clay (4510, see below), in which traces of reed mat have been found, associated with a 25 cm thick layer of sherds (4516), probably acting as a drainage floor (4516, Figs. 5-6). The remains labelled under the locus number 4512 might have belonged to a second basin, located to the west of the preserved one, but it has been almost completely removed by a modern looting pit (4503, cf. Fig. 2). A well preserved vertical drain pipe (4509) lies to the east of the earlier wall 4504 (Figs. 5, 7). Its opening was lined with several rows of fired bricks arranged in a circle and surrounded by a heap of sherds covering it at the time of discovery. Although the mouth was its only excavated part, the drain pipe 4509 is similar in all respects to the vertical ducts composed of stacked pottery rings widespread in central and southern Mesopotamia from the 4th to the 1st millennium B.C. (George 2015, McMahon 2015). Indirect stratigraphic hints coupled with the dating to the Kassite period of the sherd packing surrounding the drain pipe seem to suggest that this installation may have worked together with the drainage floor in an area where water was probably largely employed.

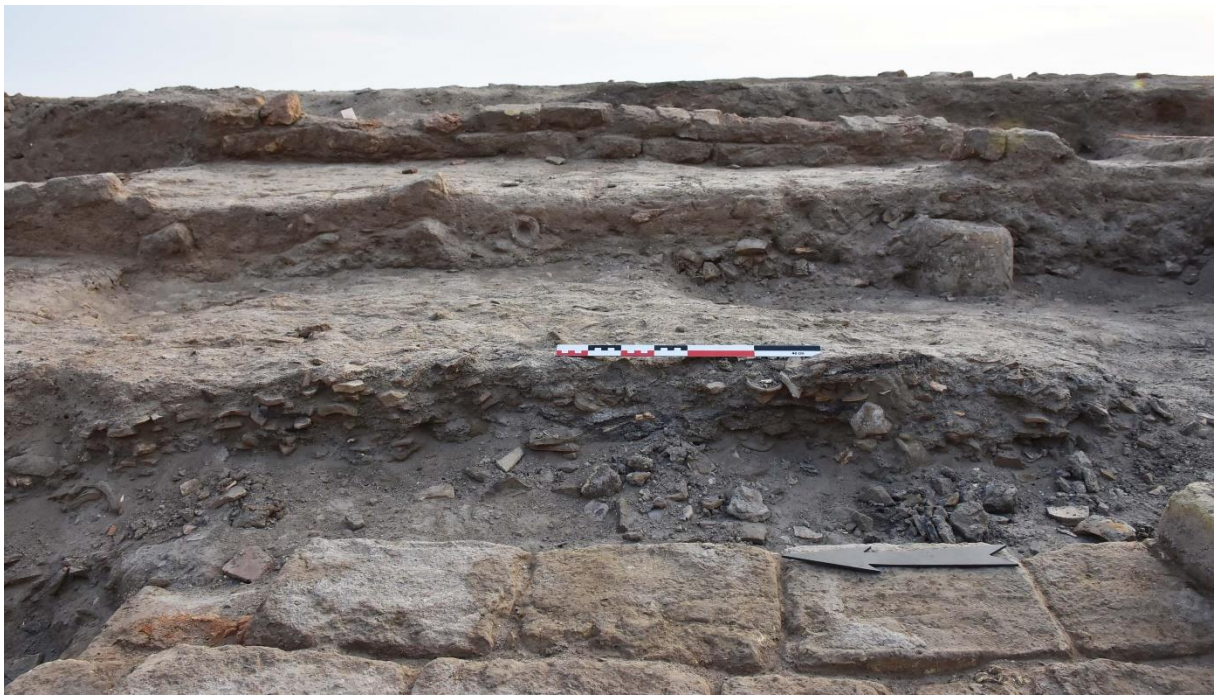

***Fig. 6** – Layers of drainage floor 4516 from the west as visible in the section of the modern looting pit 4503.*

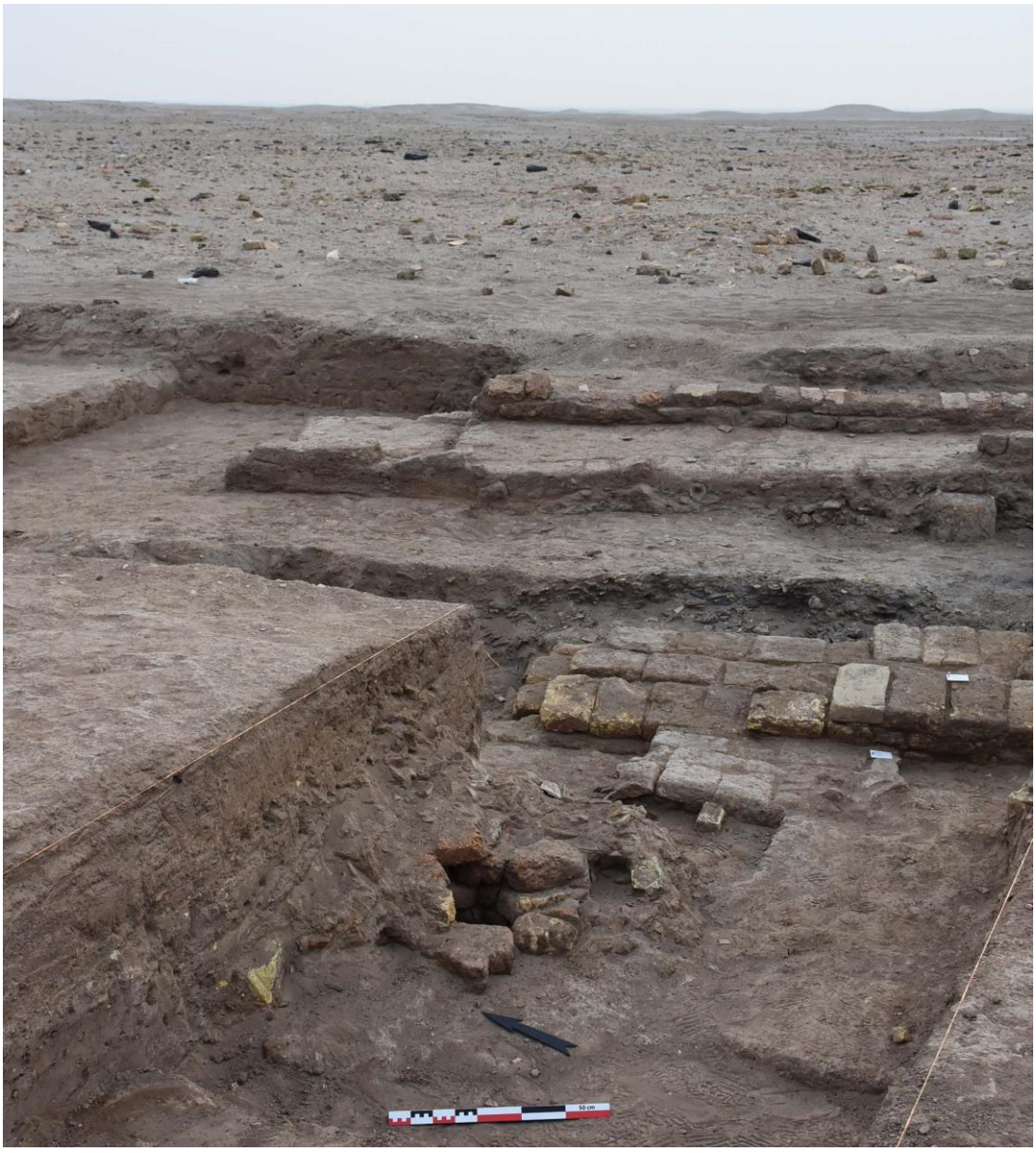

***Fig. 7** – Drain pipe 4509 from the south-west.*

Fig. 8 *– Kiln 4500 located in the northern part of the trench.*

Level 2

This level has been documented on the whole excavation area, featuring a series of kilns, working surfaces and installations probably related to the processing of clay for pottery manufacture (Fig. 2). In the northern part of the trench, a double-chamber kiln (Kiln 4500, Fig. 8) about 2 m in diameter and 1 m deep has been excavated. More interestingly, its filling has yielded some fragments of unfired vessels. An east-west oriented horizontal duct (4513, Fig. 9) made of mudbricks is preserved for a length of at least 5 m. It possibly represents a channel for the transmission of heat between different kilns, or it could be aimed at evacuating smokes. To the west of Kiln 4500, a mudbrick working surface (4514) appears to extend up to the north-western corner of the excavation area, although the bricks have only been identified in some places.

Fig. 9 *– Duct 4513 from the west.*

Fig. 10 *– View of the eastern half of Trench PZ with installation 4510 on the left and the remains of its counterpart 4512 at the bottom right.*

In the eastern part of the trench, quadrangular vat 4510 (Fig. 10), rebuilt during this level, is now connected with a sort of elongated basin made in mudbricks, including its floor. Both the vat and the basin are equipped with narrow conduits probably intended for water discharge. It is worth reporting the presence of hand-squeezed lumps of clay in association with installation 4510, probably representing tests for checking the workability of clay. The drainage floor 4516 was also operational in this level since a further layer of sherds was laid, separated from the first one by a layer of grey ashy soil. Pit 4515 (Fig. 11), containing an elongated ovoid jar and a "Kassite goblet", both fragmentary, also belong to level 2 since it does not cut any structure of this level. Moreover, the elongated jar has been found leaning on a wall of installation 4510, to which it could be functionally associated.

Fig. 11 *– Pit 4515 with a partially preserved elongated jar still in place, taken from the west.*

Level 1

Only two features seem to belong to the latest level of the Kassite phase, both identified in the eastern half of the trench: the tiny wall 4506, built in this level with reused baked bricks, and *tannur* 4508, which cut the southern extension of wall 4507 (Fig. 1 and 2).

Concluding remarks

As for the aim of the 2021 excavation campaign, the study of the structures associated with the large canal passing close to the ziggurat, one of the main outcomes of the work carried out this year was to provide new dating elements on the history of water management in the city of Larsa. In fact, despite the partial exposure and poor state of preservation of structure 4511 and wall 4504, they may be interpreted as a bridge pier and the canal quay, respectively. The presence of a brick stamped with the name of Sin-iddinam (1849-1843 B.C.) probably dates these two constructions to the reign of this sovereign.

A working area with different installations dated by pottery to the Kassite period was established at the very place where the canal flowed. The latter was certainly abandoned after the troubles that marked year 11 (1738 B.C.) of Samsu-iluna's reign, and our excavations this year show that it was completely filled in by the end of the Old-Babylonian period (probably during the 17th century, Costanza, this volume). After these events, the E-babbar complex (including the ziggurat) does not seem to have been substantially occupied. Its re-occupation dates from the Kassite King Kadashman-Enlil (1374-1360 B.C.), who was the first to undertake the restoration of the E-babbar, followed by King Burnaburiash II (1359-1333 B.C.). Both have left numerous inscriptions on the renovations they carried out.

The presence of a production area devoted to the pottery manufacture is not surprising in such a renewed context of activities. However, one may wonder if its establishment might be earlier or contemporary (or even later) to the works of rebuilding and restoration attested by the inscriptions, especially when considering the position of the workshop at the centre of the city. This question and others related to the organization of the production area, as well as the continued clearing of the canal and its bridge will be the subject of the next seasons of excavations in the PZ trench.

V – The Excavation of Building B50 in Larsa

Nadia Ait Said, Matisse Vobaure and Régis Vallet

In 2019, the excavation of mound B50, located north of the Ebabbar, revealed two superimposed buildings. On the surface, at the top of the tell, a fragmentary building of baked bricks (reused) certainly dates to the Hellenistic reoccupation of the sector (including the Ebabbar, Lecomte 1987: 1989, 1993) according to the material (from the prospection). Immediately below, a vast mud-brick complex dating from the beginning of the second millennium extends over a rectangle of 127 x 61m (7250 m2), according to geophysical prospection and field observations. Due to their architectural characteristics (location, dimensions, strength of the walls, presence of altars in the recent building), we interpret them as religious edifices, among the most important that the city must have had for the oldest of the two buildings. The Isin-Larsa/Old Babylonian complex consists of two main buildings on either side of a huge courtyard that measures 43m on each side (Fig. 1).

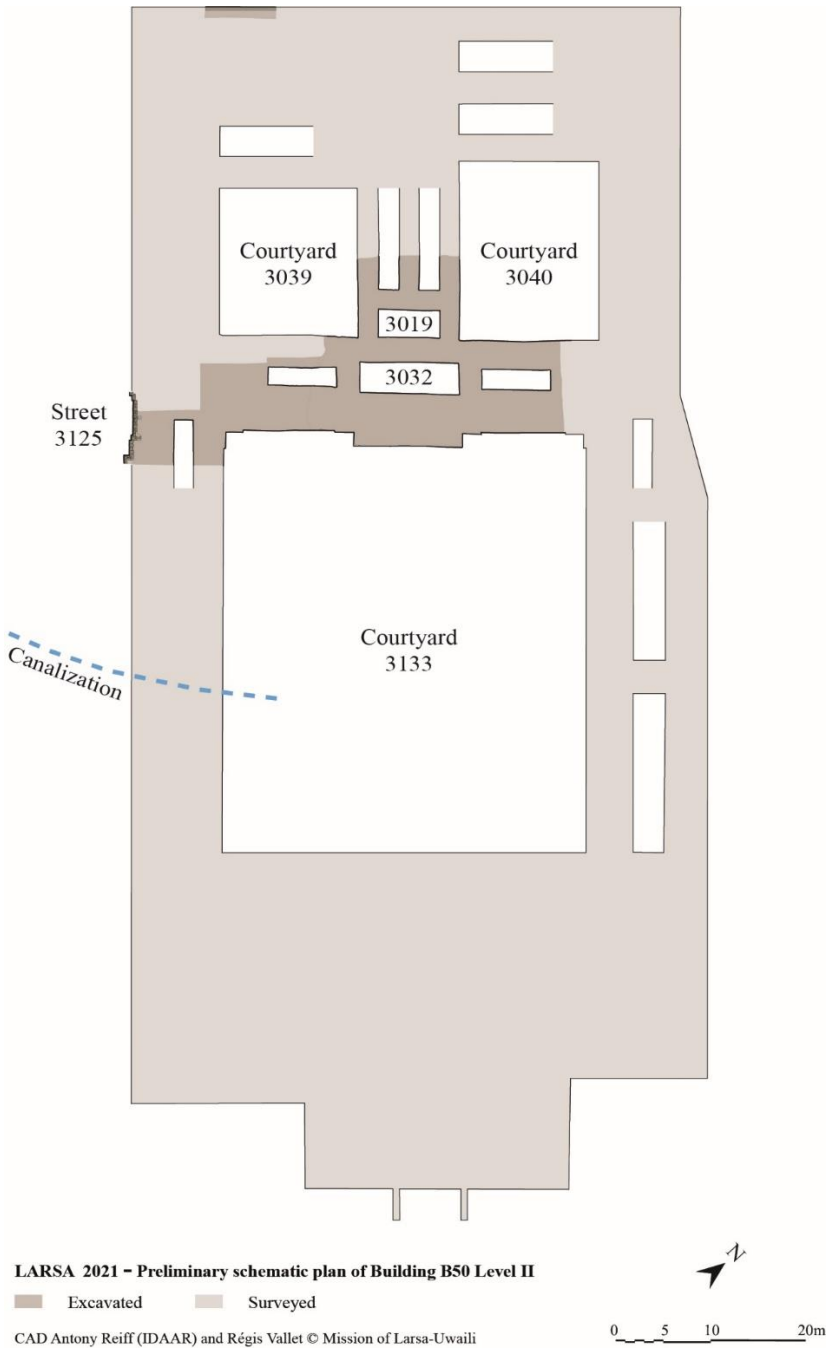

***Fig. 1** – General schematic plan of building B50 (2021).*

The entrance to the complex was to the south, facing the Ebabbar, with a building (perhaps a residence?) whose southern facade has a large central projection. The main building, the temple itself, with a surface area of 2745 m2, was located to the north. In 2019, 625 m2 were excavated. Seven rooms and two internal courtyards were discovered on either side of a band of central rooms.

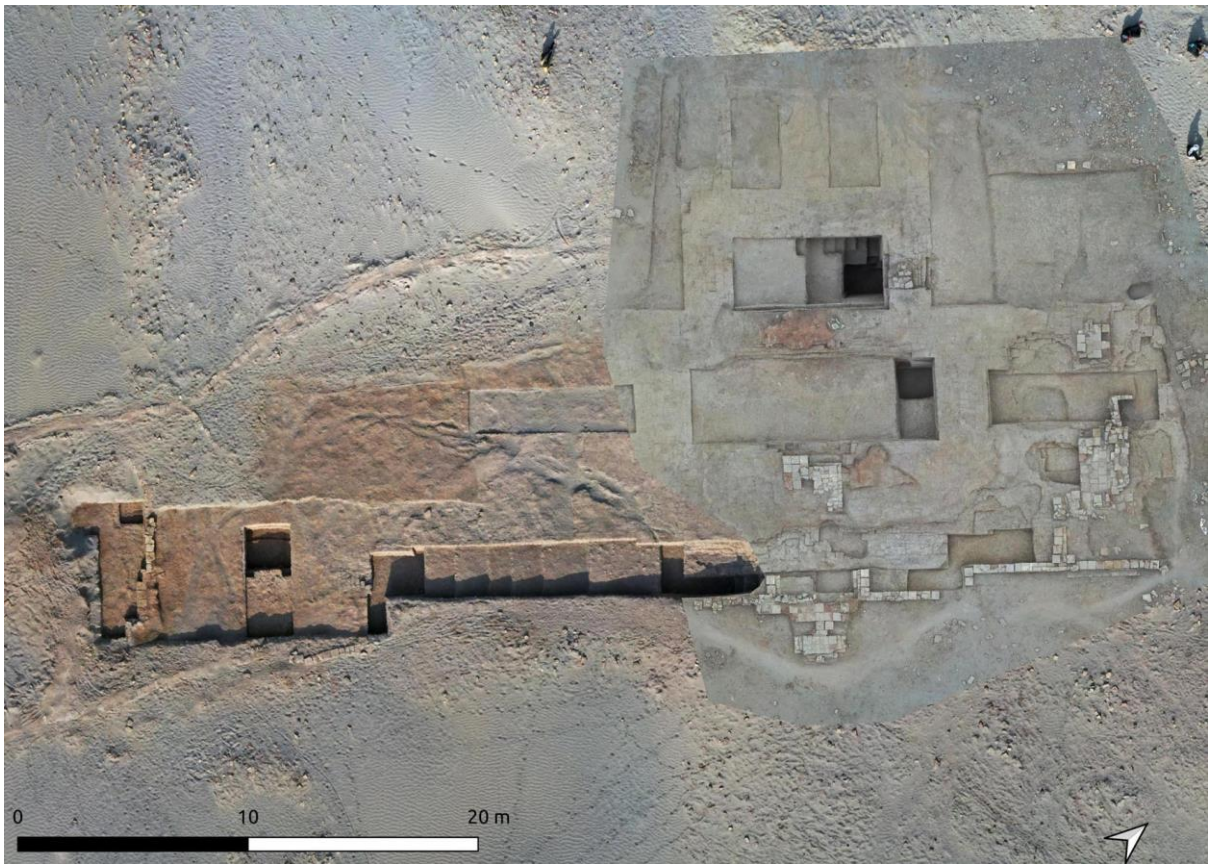

***Fig. 2** – Composite orthostatic view of Trench B50 (2019 right, 2021 left).*

The excavation in one of the rooms identified as locus 3019 (6.4 x 3.1m) led to several notable discoveries (Obreja et al, 2019: 85-86). A small deep sounding in the northwest corner found the floor of the room (locus 3053) and the foundations of the building at a depth of 4.5m below the top of the surrounding walls, further illustrating B50's monumental size, with walls not only high but also measuring 2m in thickness minimum. The construction is preserved at the top of the tell up to the level of the second floor, and its walls present a recess of 0.2m compared to those of the ground floor, presumably used to lay out the beams supporting the floors of the storey. By the end of the 2019 autumn campaign, no evidence of passageways was found however. The excavation could not go deep enough because of the colossal mass of filling to evacuate. The aim of the next campaign was therefore to reach and completely clear the floor of the room, to discover *in situ* material that would help specify the function of the room, and find passageways to uncover the system of communication within the building.

The second objective of the 2021 campaign was to continue the extensive clearing of the plan of the complex, first by finding its western limit, following the facade of the temple westwards along the large courtyard and beyond (Fig. 2 and 3). This operation was intended to confirm that the large rectangular baked brick perimeter visible in geophysics (and on the surface in some places) belonged to the ancient building, and to confirm the width of the complex and the broad lines of its overall plan.

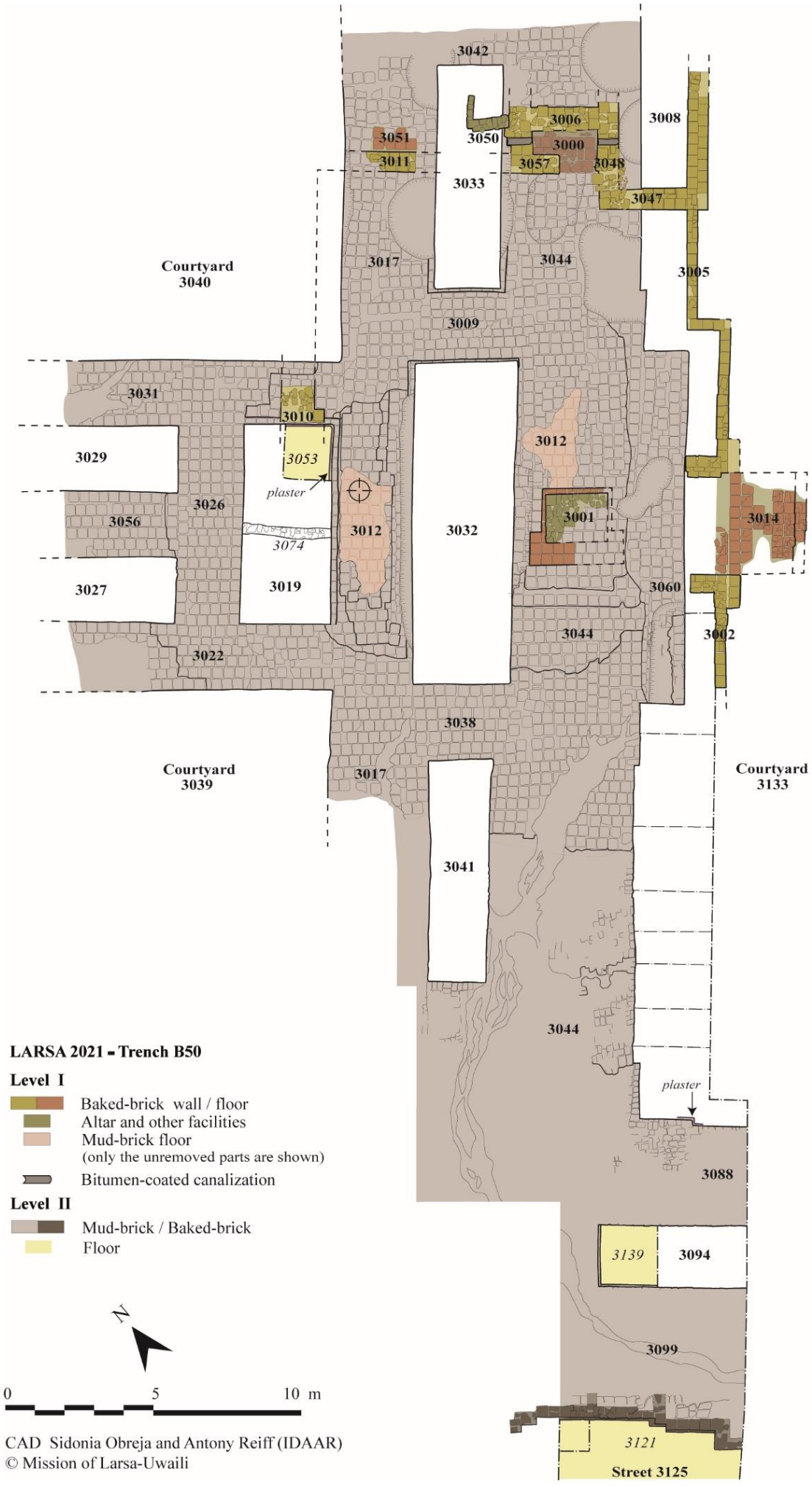

Fig. 3 – General plan of Trench B50 (2021).

The operations took place from 3 to 27 November, i.e. 21 days of work. The team was composed of four archaeologists, assisted by two Iraqi students, a photogrammeter, and twelve workers.

***Fig.4** – Left: The upper tiers of the 2019 excavations in room 3019, from which work resumed in 2021. Right: Larsa goblet and baked clay six-sided dice found in the filling of Room 3019.*

Room 3019 (N. Ait Said and R. Vallet)

In 2019, the excavations of room 3019 had stopped with the deep sounding in the southeast corner, on two tiers at the altitudes of 15.64m on middle part of the room and of 14.58m in the northeast corner (Fig. 4, left) - tiers from which the excavations restarted. The deeper filling of the room was similar to that of the upper surface, but devoid of entire rows of fallen bricks. Layers of packed earth and large broken mudbricks were found, as well as numerous pottery sherds. All the pottery retrieved date to the Isin-Larsa/Old Babylonian period (Coppini, this volume), among which two notable finds. The first was an almost complete 'Larsa goblet' found at an altitude of 14.66m, close to the western wall of the room. The second discovery was a (slightly pyramidal) six-sided dice, made of baked clay (Fig. 4, right).

In the middle of the room at an altitude of 14.98m, a pile of fragmentary mudbricks resembling a narrow low-set wall (3074) appeared. It ran the entire width of the room, from the southeastern to the northwestern walls (Fig. 5, top). The height of 3074 was uneven and fluctuated between 45cm maximum at the south and 24cm at the north (alt. 14.79m), with a base at 14.36m at the deepest, while its thickness varied between 36cm to 8cm. Only the northeast facing side shows brick parts that appear laid out horizontally, more or less regularly. On the other side, the definition of the bricks and their layout was indistinct. The structure does not actually have a southwest face and it is not strictly speaking constructed. Devoid of mortar, it is only a pile of fallen bricks, without any associated soil or layer of occupation in the heart of the room's filling. Given these characteristics, we interpret it as a witness to an ancient episode of looting. Shortly after a first phase of collapse of the building (and certainly in the course of the 2nd millennium B.C.), looters excavated the room. They moved its filling from one part of the room (to the east) to the other, and gradually raised with the recovered materials this small barrier so as to be able to continue digging (no doubt they were trying to reach the floors) without being invaded by their own rubble. It follows from this

observation that the current filling to the east of this structure is more recent than that found to the west. This is where we enter into the micro-history of ruins, which is always complex in this type of monumental building. However, the interest of the anecdotal structure 3074 does not lie in these details.

Fig. 5 *– Top: Northeast facing side of structure 3074.*
Bottom: First stamped brick found, in the upper middle part of 3074 (under the scale).

During the search of the (non-existent) southwest facing side of 3074, a fragmentary stamped mudbrick emerged in the top middle part of the structure, at an altitude of 14.79m (Fig. 5, bottom), followed by two other broken stamped bricks close to 3074, on its southwest side. A careful dismantling of 3074 and the associated collapse was then carried out. It led to the discovery of seven additional fragmentary stamped bricks. In total, ten stamped bricks were discovered, five within 3074, the other five laid to the south of 3074, at an altitude between 14.72m and 14.25m.

All are inscribed with partial lines of two texts attested at Larsa, known to commemorate the construction work of king Sin-iddinam (Charpin and Jacquet, this volume). Eight bricks are inscribed with an inscription that commemorates the laying of the foundations of the E-babbar (Frayne 1990: 160-161, inscription no.3). The other two bear a different text that records construction work carried out in the temple (Frayne 1990: 161-162, inscription no.4). The presence of these documents within B50 is remarkable, and permits the attribution of the construction of the building to king Sin-iddinam (1849-1843 B.C.), since there is no doubt that these bricks come from the collapse of the highest parts of the building. However, inscriptions concerning the Ebabbar in the walls of B50 raises questions. The working hypothesis is that B50 may have been the residence of the priestesses-*entum*, the *Gipar*, devoted to the god Šamaš.

Fig. 6 *– Left: Southeast and Northeast walls of room 3019 being cleared*
Right: Detail of the masonry of the southeast wall.

Fig. 7 *– Room 3019 at the end of the 2021 excavation.*

During the excavation, the face of all four walls of room 3019 were progressively brought to light (Fig. 6, left). The structure of each wall is remarkably well preserved. Evidence of a white substance that once covered the walls was found on their surface, but the plaster is only preserved at the

bottom of the wall, on the first layers of bricks. The bricks used in the construction are square bricks 34-36 cm side, as observed in 2019, but for reasons of alternation of apparatus, to ensure its cohesion, the facings of the walls see the use of other formats. In particular, half-format bricks, rectangular, more or less long, most often 25 x 15 x 9cm, arranged in stretchers and headers, whose alternation is not always regular (Fig. 6, right). The masonry is organized in groups of seven layers of bricks, separated by thick reed beds (up to 6cm) embedded in mortar, except for the base of the wall that has only five layers under the first reed bed. At the level of some of the reed beds, there are slight shifts in the plumb line of the wall faces, which are quite regular and do not seem to be attributable to the work of the masonry over time but seem original. It is possible that at least some of these are due to the change of the masonry team.

***Fig. 8** – Anchor points in the northwestern wall of Room 3019.*

As the excavation approached the floor (3053) of the room, it became evident that no door or passageway would emerge and at the end of the excavation, although we did not have time to reach the floors due to the huge mass of fill to be removed, the absence of passageways was confirmed. The excavation of room 3019 ended at the altitude of 12.72m along the southeast wall, i.e. less than 0.5m above the floors 3053, 1m above in the rest of the room (Fig. 7). There is also no evidence that doors were once made and later closed-up and filled. The only serious irregularity in the brick layout was found on the western wall where the unusual superposition of vertical joints gives the appearance of a small closed-up window, which hardly seems compatible with the width of the wall (2m). It is probably an anchor point of the scaffolding for the construction of the building that was later filled in. Two holes were also found on the face of the northwestern wall (Fig. 8). These holes, set 0.6m apart at an altitude of 13.78m (approximately 1.75m above the base of the walls), 25cm wide and 50cm deep, where certainly smaller anchor points, probably left visible

due to the fact that the room was concealed[1]. Room 3019 therefore functioned as a blind room. Set only one room away (3032) from the entrance of temple, no access to it was possible except from the upper storey of the building. One of the questions that future work will have to answer is what could be the function of such a sealed room located at the heart of the building. The temple treasury (or treasure warehouse) would be a good candidate for such a room.

The extensive excavation (M. Vobauré and R. Vallet)

In order to clear the complex up to its western facade, a 3m wide east-west trench was opened along the southern facade of the temple, i.e. along wall 3044, in the large courtyard 3133. As there was no question of removing the collapsed part of the building, which was known to be considerable (about 4m in the centre of the facade, at the top of the Tell), the excavation proceeded in tiers, lowering as the excavation progressed towards the west down the slope (Fig. 9). Starting from the large central redan of the facade (3060), seven tiers were necessary, over a difference in level of more than 2.6m, to reach the north-western corner of the large courtyard 3133 at the bottom of the slope, 17m from the point of origin of the trench.

Fig. 9 *– View of the trench along wall 3044, from the west.*

To the east, at the top of the Tell, the remains of the recent building were not dismantled, the southern wall of the trench being aligned with wall 3002, preserved on a single layer of baked bricks which rested on a powerful adjustment layer (about 0.20 - 0.25m), mixing building soil and materials borrowed from the underlying collapse, acting as footing (3072) for the front part of the

1 There is little doubt that these are anchor points for an imposing wooden structure, but rather than the scaffolding of the construction work, another hypothesis exists, which will have to be verified in the field by examining very carefully the facings of the walls (which were the subject of only a quick examination at the end of the campaign). If other similar anchoring points do not exist, then it is likely that the wooden shaft of a freight elevator, extending up to and including the second floor, was anchored there. A part of the floor of the room on the second floor was simply made mobile, in order to serve the blind room hidden below. The Ancients were perfectly capable of realizing a device of this nature, which seems to us on reflection more probable than a traditional staircase, of which we see no trace anywhere and which poses problems of handling heavy loads.

recent building, washed away by erosion at the top of the slope. Along the facade, the trench thus encountered only one and unique layer, the enormous collapse (3087) of the ancient temple. Very homogeneous, mixing fragmentary mudbrick, more or less decomposed, and aeolian deposits, it did not yield any notable object, apart from the ceramics (exclusively attributable to the beginning of the second millennium, Coppini this volume).

To the north, within the perimeter of the building, it was stripped over a width of approximately 7.8m, down to the small rectangular room 3041, which was fully demarcated (7.2m x 2m) but not excavated. At the level of this room, facade 3044 reaches a width of 4.8m, even more to the west where there does not seem to be a room immediately following 3041. This is on the slope of the Tell so that the top of facade 3044 is deeply gullied by the run-off, and its apparatus completely washed away. The brick has melted returning, except in places, to its natural clay state. There is no doubt however that the core of the masonry, there as at the top of the tell where recent vestiges have helped to protect it, was made of the same 34 to 36cm square bricks (fluctuations which probably indicate the use of several brickworks, if one considers the astronomical number of bricks required).

Fig. 10 *– The west corner of redan 3060, from the southwest.*

In the trench, the facing of facade 3044 was uncovered in elevation over three to nine layers, depending on the tier. To the east, the corner of the large central redan 3060, destroyed above by a recent pit, was uncovered and exposed over 0.5m in elevation. Integral with the wall itself, with which it is perfectly linked, it is a 1.4m projection by 11m long redan (Fig. 10). Two other redans, of much smaller size, 0.2m i.e. a 'half-format' brick, broke the monotony of the facade. One is in the extension of the central redan, 2m long, the other at the end of the facade in the corner of the courtyard, 1.9m long, where it formed a corner redan with its equivalent, 1.7m long, of the west wall of the courtyard (3088). While it has disappeared everywhere else, the plaster was exceptionally well preserved on the latter, of a pure white colour and drawing a perfect corner edge (Fig. 11). Like those of the rooms (cf. 3019 supra) and for the same imperative reasons of masonry cohesion,

the facing of the facade shows the use of rectangular 'half-format' bricks, here 30 x 18 x 11cm, sometimes in stretchers and sometimes in headers, and as in room 3019, there are misalignments (possibly accentuated by late landslides, but original in our opinion) between the groups of layers, at the level of the bed adjustments in reed, up to 10cm in the centre of the wall, which have certainly been made up for (camouflaged) by the lost coatings.

***Fig. 11** – plaster of the redan of wall 3088, from the south.*

To the west, beyond the courtyard, we decided to increase the width of the trench to 6m, so as to open up a substantial part of the west wing of the complex. The wall 3088[1], which delimits the large courtyard 3133 to the west, is 3.25m wide (3.45m at the level of the courtyard's corner redan) and separates it from a narrow room 3094 oriented north-south, 2m wide and more than 5m long (it continues into the south berm). The room does not communicate with the temple proper to the north, and forms an integral part of the band of rooms that flank the large courtyard 3133. In this whole sector, the altitude of the top of the remains dropped considerably by about 3m in comparison with the central sector, while room 3094 is of reduced dimensions so that a sounding to reach the floors and the base of the construction became feasible. The northern end of room 3094 was therefore opened up over a length of 2m (2 x 2m). Under a collapsed layer similar to that of the neighbouring courtyard, but including here, to our surprise, a significant number of fragments of baked bricks, the floors (3139) made of yellowish clay appeared at 12.10m (Fig. 12, left), i.e. 1m below the surface. A whole jug (L-W-3135-01), small in size, was in place, wedged in the northeast corner of the room (Fig. 12, right). The floors, about ten centimetres thick, were laid at the same level as the wall base and rested like the walls on the dark brown compact earth layer already recognised under room 3019, and at the same altitude of 12.02m. As in Room 3019, the base of the walls (except for 3088 to the east) was slightly protruding, forming a plinth (0.13m to the west, 0.6m to the north) over five layers of elevation.

[1] It should be noted that it presented on the surface a whole layer of bricks of 28 x 17cm. The use of rectangular bricks was therefore not reserved for the facing of the walls of the building.

***Fig. 12** – Left: Room 3094, from the southeast. Right: in situ pottery in the northeast corner of the room.*

While questions were raised about the presence of fired bricks in the filling of the room, the extension of the trench to the west immediately provided an answer. As early as the 2019 survey we had noticed on the surface (and in geophysics where it was not visible) the disrupted layout, in baked bricks, of the rectangular perimeter of the temple, a kind of temenos that we thought, because of the material, was that of the recent building. The stripping of wall 3099, west of the small room 3094, showed that it was the facing, one course wide of bricks (35cm square x 10cm thick) of the facades of the ancient complex (Fig. 13).

***Fig. 13** – The western façade of the temple (wall 3099) with its baked brick facing, from the west.*

Wall 3099, in mud brick except for the outer facing, is 4.8m wide (as is 3044), but this varies as its outer facing has an elaborate set of niches and double redans. It is 5.20m wide at the level of the most prominent redans. We were able to completely clear one niche, which measured 3.70m long. The panels of the median redans are offset by 40 cm, a little more than a whole brick, in relation to the niches, but in two stages, with a first offset of 20 cm, then a second 54 cm further on. Their (total) length is 2.16m. The outer redans panels are more prominent, protruding 56cm from the middle redans. Their length is still unknown (perhaps equivalent to that of the niches?). On the other hand, the cohesion of the structure, in the absence of an ordinary connection here, which is very difficult if not impossible to implement (but we did not dismantle the wall), was ensured by the anchoring points of the fired facing in the unbaked masonry, deep by one whole baked brick

(certainly alternating there, in the anchorages, with the unbaked apparatus), at the junction of the niches and the median redans and in the centre of the niches, i.e. every 1.8m. On the question of stability, which inevitably has an impact on the processes used, it is necessary to take into account the fact that the elevation of the facing, which did not necessarily reach up to the top of the walls, is not known. Despite this reservation, it seems clear that the complex play of niches and redans, multiplying the offsets also had in addition to its aesthetic and symbolic functions an eminent architectural role, which substantially increased the stability of the facings that protected the walls themselves.

***Fig. 14** – The base of the baked brick facing of wall 3099, above the brown fill 3122, from the west.*

Further west, where we now knew we were outside the ancient building, the stratigraphy of the temple, right down to its foundations, could be quickly uncovered, given the slope of the ground. The trench was therefore continued over its entire width, 2m beyond the building, i.e. a strip of land measuring 6 x 2m along the facade. Under the reddish powdery layer (decomposed bricks) of the building's destruction, only about 30cm thick, the floors of street 3125, adjacent to the temple, appeared at 13.09m (i.e. 1m higher than those of nearby room 3094) in the form of a beautiful yellow clay soil. A similar soil lay at their base, at about 12.90m, and between them more indistinct greyish occupation beds (3121). All these soils rose quite steeply to the east against the temple's facing, the base of which, at the altitude of 13.09m, showed a slight projection (of 8cm, on three layers, and four in elevation above). Under the floors, in the foundation, the base of the baked brick facing appeared at 12.80m, (i.e. 0.78m higher than that of the mud-brick masonry of the same wall 3099), set in a layer of dark brown fill (3122), identical to that already identified under rooms 3094 and 3019. A thin bedding of ashy occupation (3123), passing just below the baked brick facing (alt. 12.77m), separated the fill into two parts, upper and lower, in which the excavation stopped at the altitude of 12.59m (Fig. 14).

All these data shed light on the first stages of the temple's construction. It appears that the ground was carefully levelled, judging by the identical altitude of the foundations of rooms 3019 and 3094

(12.02m), which are more than 20m apart. The effect of the operation was to lower the construction plane by about one metre in relation to the surrounding ground to the west, and perhaps more to the east where the ground rises. The bottom of the pit seems to have been covered by a layer of brown earth, the thickness of which we do not know, on which the mud-brick base was built (five layers) as well as the start of the actual raising of the walls (two layers). It was at this stage of the work that the perimeter of the pit, forming a trench around the facades, was filled in with the remaining brown earth, on which the ash bedding 3023 deposited during the work. The raising of the walls was then resumed, this time accompanied by the raising of the baked brick facings of the facades, the bases of which were later backfilled in turn, before the floors were laid.

***Fig. 15** – The baked brick facing of the northern facade of temple B50, from the northeast.*

Finally, in the last days of the excavation, a small team was delegated to strip the facing of the north facade of the temple, which had been invisible until then and which a sand dune had just uncovered when it retreated (Fig. 15). A 5m long section of the baked brick facing was uncovered on the north-west side of the building, which allows us to propose a first schematic plan of the whole B50 complex.

V – The Excavation of Building B48 in Larsa

Pauline Jaccard

***Fig. 1** – Aerial view of Building B48, from the northwest (2021).*

During the spring 2019 campaign, prospecting over the entire site has enabled a significant proportion of ceramic material dating from the Paleo-Babylonian period to be collected in the area located approximately 400 m north of the E.Babbar. In this sector, moreover, the outline of two large houses (B48 and B49) had been located on the surface as early as the 1980s (Huot, Rougeulle and Suire 1989: 44), revealing plans very comparable to those of buildings from the Old-Babylonian period thein being excavated (Calvet 2003b), but in a much more remote area to the north of the site. To get a picture as complete as possible of Larsa in the Old-Babylonian period, it was therefore decided to continue during the autumn campaign of 2021 the exploration of building B48 ant its immediate surroundings started in the autumn campaign of 2019.

During the previous campaign we were able to clear the almost complete plan of the large house B48, thanks to the well-preserved cooked brick basement of its walls (Fig. 1 and 2). This house covers an area of at least 680 square meters (32.50 x 21 m). Two tombs were also located in the north-west corner of the building. The 2021 campaign therefore had the purpose, in one hand, to find a preserved ground level in order to date the oldest occupation period of the building, and in another hand to explore the tombs and their immediate surroundings. It was decided in a first step to excavate two rooms in the south-east corner of the building, the room 1531 and the room 1538.

1. The excavation of rooms 1531 and 1538

These two rooms were chosen to be excavated during the 2021 excavation campaign because they seemed to be good candidates for clarifying the dating of building B48 (Fig. 3). Indeed, the first room, 1531, showed in its highest levels a backed brick floor that seemed to be relatively well preserved, despite a looting pit identified in its south half. The second room, 1538, adjacent to the first and larger, did not seem to have been subjected to the passage of looters, and revealed occupation floors only covered by a thin layer of eolian sand. The first room as well as the second

provided decisive clues as to the dating of building B48 and gave keys to the understanding of the organization of this typical house of the Isin-Larsa/Old-Babylonian period.

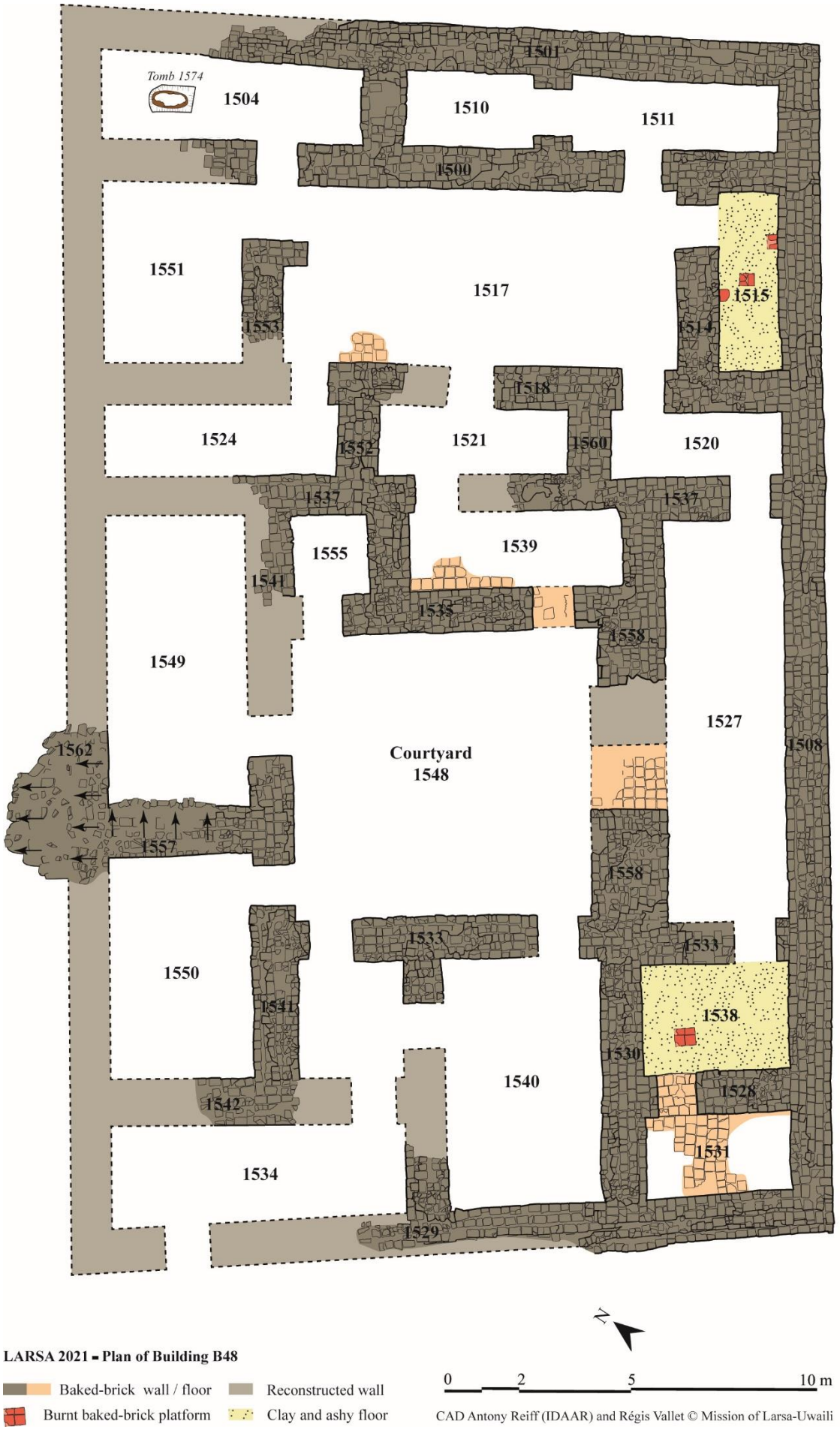

***Fig. 2** – General plan of Building B48 (2022).*

Room 1531

Room 1531 is the southern corner of house B48. It is a small rectangular room measuring 3.85 m in length and 2.06 m in width, with an opening on the north side of its eastern wall to room 1538. This passage measures 0.85 m long and 0.80 m wide. The room is bordered by four walls arranged in the best-preserved places of four layers of baked bricks, appearing for the highest at 10.4 m above sea level. The bricks are rectangular and measure about 20 cm in length, 15 cm in width and 5 cm in thickness. No mortar binding the bricks together was observed on the top layers.

***Fig. 3** – Zenithal view of rooms 1531 (left) and 1538 (right) in Building B48.*

After the removal of a layer of eolian sand about 10 to 20 cm thick, the first levels of occupation of the room appeared. In the center of the room was a flat floor made of square terracotta tiles of various colors and identical dimensions (28cmx28cmx4 cm) that appeared from 10.02 m above sea level (Fig. 4). It was destroyed in the southern half of the room by a large circular looting pit measuring about 2 m in diameter. In the northern half of the room, the tiles have also been removed, but their slightly pinkish installation level does not appear to have been disturbed anthropogenically. Only a small oval pit of about 20 cm in diameter, probably a burrow, crosses it. To the west of the room, between the west wall and some tiles, were numerous fragments of what appeared to be a same ceramic vessel.

The tiles that have been partially preserved in the room continue in the passage between rooms 1531 and 1538 (Fig. 5). However, it differs slightly from the one visible in room 1531 in its design. The tiles appear to be sometimes broken, sometimes reassembled from different pieces. A corner of one of the tiles, laid at an angle, has been coated with bitumen, probably to flat down the circulation level. This threshold leads to room 1538, which has no tiles.

***Fig. 4** – Oblique view of room 1531, from the northwest.*

The function of this room, which is relatively small, on the fringe of the house and probably originally entirely tiled, cannot be established with certainty, given the absence of built features (apart from the tiled floor) and the paucity of the material collected. However, the presence of the tiled floor (with traces of bitumen), its exclusive association with the neighboring room 1538 and its small size, militate in favor of the hypothesis that it was the storeroom of room 1538.

***Fig. 5** – Oblique view of the threshold between rooms 1531 and 1538, from the northeast.*

Room 1538

Room 1538 is located to the southwest of house B48. It is a rectangular room measuring 3.93 m in length and 2.84 m in width. In addition to the passage to the east with room 1531, it also has a doorway to the south of the west wall that is partially preserved. The best-preserved points of the walls are 10.02 m above sea level and are built on five courses of fired bricks.

***Fig. 6** – Oblique view of room 1538 and the demolition layer from the west.*

The room was covered with a layer of eolian sand about 20 cm thick. Beneath this was an indurated demolition layer, pinkish and sandy, rich in ceramic shards and brick fragments, with a thickness varying between 10 and 30 cm (Fig. 6). In the southeast corner of the room appeared the top of a complete ceramic vase. Under this demolition layer, the most recent occupation levels of room 1538 appeared almost entirely preserved. This surface dipped slightly from west to east and was in the form of a thin, black, highly organic indurated layer, rich in charcoal and ceramic shards. This occupation floor also retained various traces of the activities that the room hosted. Several entire ceramic vessels were discovered lying on the floor (Fig. 7, left), bowls and jars identified as belonging to the Isin-Larsa tradition (Coppini, this volume).

***Fig. 7** – Room 1538: one of the two in situ jars being excavated (left), burnt hearth base (right).*

The thin black organic layer appeared at its highest point at 9.91 m above sea level. It worked with a square structure consisting of four terracotta tiles placed west of the passage between rooms 1531 and 1538 (Fig. 7, right). This structure was approximately 0.6 m square and consisted of a single layer of four tiles, showing signs of exposure to fire or extreme heat. The function of such a device could have been a hearth base. The occupation soil also reveals several hollow structures piercing the thin black layer. These regular, circular hollows measure on average about 20 cm in diameter and are preserved to a depth of less than 10 centimeters. They are organized in a rectilinear fashion along the east, south and west walls of the room (Fig. 8). The arrangement of the hollows among themselves and with the walls of room 1538 seems to indicate that these structures find their use in the organization of the room itself. They could constitute evidence of shelves organized along the walls, or of posts organized around the central space of the room.

***Fig. 8** – Layout of the circular hollow structures (in yellow) of room 1538.*

Preliminary conclusion

The fall 2021 excavation campaign clarified the dating of the most recent occupation phases of building B48 as well as the organization of the house itself. The small room 1531 showed a tiled floor, disturbed by a large looting pit to the south. Despite the absence of furniture other than a few shards of pottery, the most likely hypothesis is that it was the store of the next room. The second room 1538 is larger and does not seem to have been destroyed by looters. It shows a black organic floor around a probable hearth base and a dozen small circular hollows aligned along the east, south and west walls of the room. On this floor were placed at least two Isin-Larsa broken jars, thus confirming that this large house belongs to this period. Despite the absence of kitchenware, it

seems that culinary preparation took place in this room, which we can propose to interpret as a kitchen, perhaps for the service of the very large room next-door 1527.

2. The excavation of tombs 1574 and 1618

This exploration of B48 was subsequently continued by the excavation of two tombs in the area of the eroded northern corner of B48, which also provided clues to the Isin-Larsa dating of the building (level I) and of the level immediately below (level II). In 2019, two funerary structures were identified (1574 and 1618), installed in the south-north slope due to erosion and marking the preserved limit of building B48. They were similar in appearance and only two meters apart (Fig. 9). Their excavation revealed a first intact immature burial and a second burial probably looted in the past.

***Fig. 9** – General view of the tomb 1574 (right) and 1618 (left), from the west.*

Tomb 1574

This burial was discovered in the north corner of building B48, in room 1504, under the floors of the room, washed away by erosion above the tomb but still visible in section a little further south. It partially cuts wall 1619 of level II and is located south of burial 1618. It is oriented along a north-west/south-east axis, and the individual had his head to the north-west.

The burial pit and funerary architecture

The contours of the pit could be clearly seen before the excavation (Fig. 10, left). It is a regular rectangular pit measuring 1.30 m long, 0.65 m wide and 0.25 m deep. The pit intersects the 1619 mud-brick wall at its northern end. The internal fill of the grave, under the upturned vat, and external fill, between the basin and the edges of the burial pit, consist of a homogeneous white-yellow sandy sediment without inclusions. The skeleton of the immature individual was placed under an upturned terracotta vat oriented, like the rest of the burial, along a north-west/south-east axis. Oval in plan, the vat shows concave walls and a flat bottom, collapsed in the past, almost in contact with the deceased (Fig. 10, right). It was made of very thick ceramic, 3 to 4 cm thick,

yellow-gray in color. Originally, its inner sides were probably entirely coated with bitumen. It was 0.91 m long, 0.40 m wide and 0.25 m high. It appears at 9.93 m above the sea level. This vat, as well as the similar one in tomb 1618, dates from the Isin-Larsa period (Coppini, this volume). The size of the burial container appears to be disproportionate to the size of the deceased, placed against the north side. Fragments of the bottom of the basin were discovered above the skeleton, some in direct contact with the bones, testifying to the presence of empty space during the placement of the burial.

***Fig. 10** – Tomb 1574 before excavation (left), clay cover of the tomb (right).*

Description of human remains and taphonomic observations

The grave contains the remains of a young immature individual who died between 4.5 and 7.5 months of dental age (Al-Qahtani 2012). Although the bone material is heavily degraded, the bones retain some anatomical coherence and reveal the primary nature of the deposit. The general position of the skeleton indicates that the cadaver was lying on its back with the arms flanking the trunk, the right forearm slightly flexed toward the abdomen, the left forearm not observable, and the lower limbs flexed outward in a "frog" position (Fig. 11). Several anomalies in relation to the position and original state of the skeleton were observed. They give us information about the taphonomic processes that modified the initial aspect of the tomb.

***Fig. 11** – Tomb 1574 excavated.*

The various fragments of the cranial vault found were crushed, scattered around their primary position, and some were displaced and disturbed by the fall of pieces from the overturned vat (Fig. 12). The initial position of the head is therefore not determinable. The mandible appeared to be resting in an upper view, a possible indication that it fell during decomposition. Nothing is less certain, however, given the state of preservation of the bones. The position of the cervical vertebrae could not be observed in the field for the same reasons, and the rest of the spine appears to be connected. The few preserved and observable ribs show that the rib cage has opened and laid flat. Of the shoulder girdle, only the right clavicle remained, which is not verticalized. The right humerus lies in anterior view, in contact with the right ribs. The right elbow is dislocated, as is the forearm. It is slightly flexed towards the pelvic girdle, in pronation. A few bones of the right hand were observed anterior to the right ilium. They appear to be dislocated. Only a fragment of displaced left humerus represents the left upper limb. It is not sufficient to discuss the primary position of the limb. The two iliums lie flat at the bottom of the sepulchral fossa. They reflect the opening of the pelvic girdle. The coxo-femoral joints are loose, and the lower limbs are spread outwards. Both knees are dislocated, as are the right tibia and fibula. The bones of the feet are not preserved.

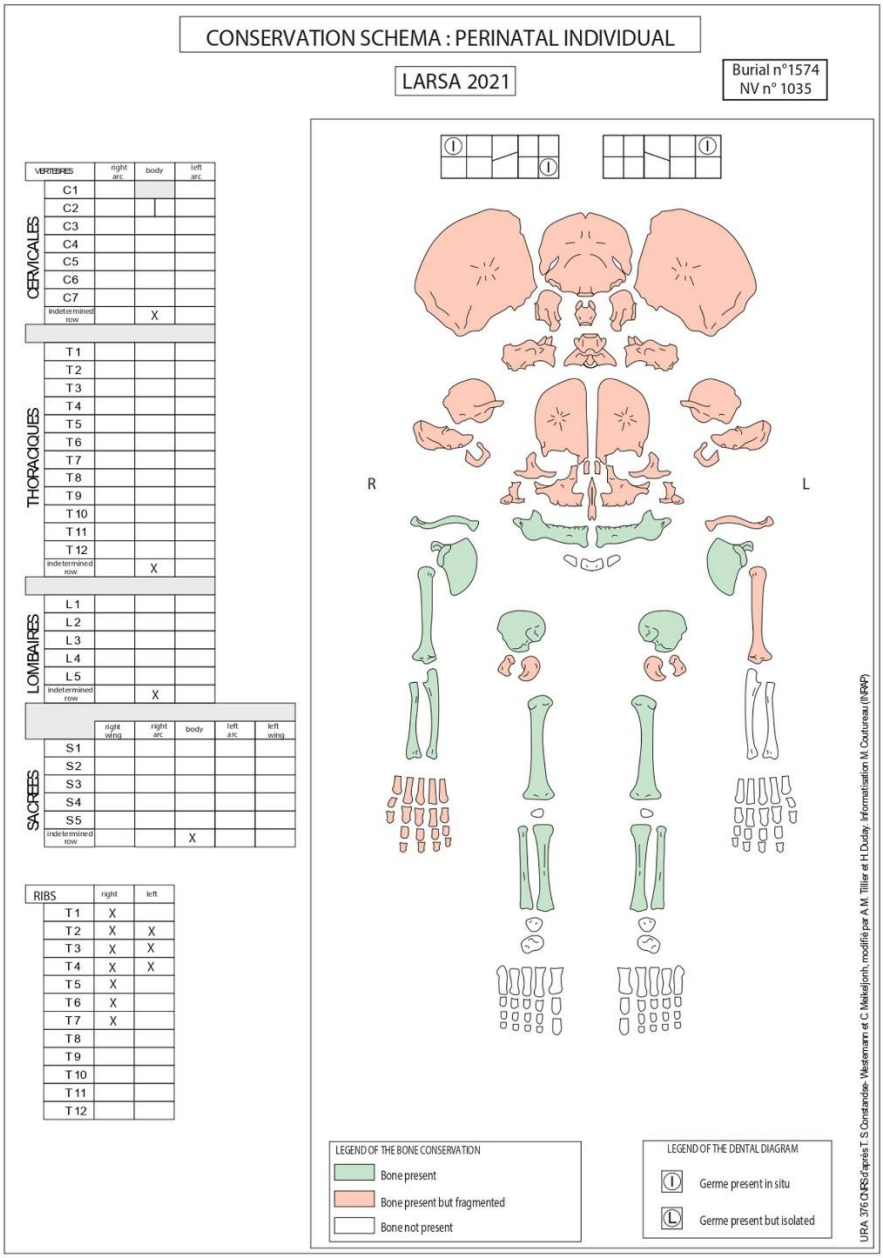

***Fig. 12** – Conservation schema of the young immature n°1035.*

The bones have retained their anatomical logic. The displacements took place both inside (flattening of the thorax, opening of the pelvic girdle) and outside the initial volume of the cadaver (possible dislocation of the mandible, dislocation of the right forearm, the knees, and the right fibula). These displacements imply the persistence of empty space around the corpse during decomposition and suggest that decomposition took place in empty space. Given the absence of a good part of the skeleton's bones, however, it is difficult to be affirmative about the restitution of the mode of burial using the study of bone taphonomy alone (Fig. 13). Observation of the burial device, however, provides additional arguments for a decomposition in empty space. Part of the collapsed bottom of the basin was indeed discovered in contact with the individual, attesting to the absence of sediment between the latter and the rest of its cover during its installation. The skeleton does not show any signs of stress, nor of alignment or wall effects. It therefore does not allow the elaboration of a hypothesis as to the presence of a container made of perishable material inside the vat itself, even if the available space would allow it. In the same way, if the taphonomic arguments do not make it possible to decide on the presence or absence of a flexible envelope, the opening of the rib cage as well as the spread-out position of the lower limbs tend to exclude the presence of a flexible envelope enclosing the limbs in a constraining manner, like a shroud swaddling the infant.

Fig. 13 *– Detail view of the skeleton of the tomb 1574.*

Biological data

The sex of the subject buried in Burial 1574 is indeterminable given his young age. In terms of age at death estimates, the grave contained the remains of an immature juvenile with a dental age between [4.5 - 7.5 months] (Al-Qahtani, 2012). The long bones were measured and deliver an estimate of a bone age between [1.5 - 9 months] (Scheuer and Black, 2000). The latter estimate is inaccurate in view of the poor overall bone preservation. It is preferred to estimate the dental age. The osteological study did not identify any bone changes or anatomical anomalies.

Tomb 1618

This burial is located north of the burial 1574 and is oriented along a north-east/south-west axis. It was built in a narrow room of the mudbrick building of level II, and is located on the route of the northern wall of building B48 of level I, which was washed away by erosion at this point (a section of it remains further west). It appears to have been looted in the past, probably after the erosion has removed the upper level to expose it.

The burial pit and funerary architecture

Except for the general orientation of the burial, the tomb 1618 appears to be very similar in its layout to the tomb 1574. The burial pit shows a regular rectangular plan and measures 1.27 m long, 0.82 m wide and 0.30 m deep (Fig. 14). The internal and external fillings consist of a homogeneous white-yellow sandy sediment. The inner fill, however, yielded a few fragments of human bone.

***Fig. 14** – Tomb 1619 excavated.*

In the burial, a terracotta vat was once again installed in the center of the burial pit, turned upside down and oriented along a north-east/south-west axis. It had the same shape and was made of the same ceramics as the vat in the burial 1574, and only its slightly larger dimensions differentiate it from the one in the burial 1574. It was 1.10 m long, 0.50 m wide and 0.29 m high. It appears at 9.42 m above the sea level. The bottom of the basin seems to have collapsed inside it, but, unlike the burial 1574, only few small fragments were found in the internal filling. The rest of the fragments, as well as the individual probably originally buried under the cover, were destroyed by a looting episode.

Description of human remains and taphonomic observations.

The looting pit inside the terracotta vat did not spare any bones in the primary position. Only a few small immature bone fragments were found in the secondary position, scattered in the internal filling. It is therefore impossible to state with complete certainty that the burial 1618 originally contained an immature individual in primary position. However, several clues provide solid support for this theory. On the one hand, the bone spalls constitute a Minimal Number of Individual (MNI) of 1 and all belong to a young immature individual. On the other hand, they represent a major part of the large anatomical segments and deliver remains of the craniofacial block (fragments of left petrous and basicrane), of the mandible (bone fragment and fragment of a right lower second decidual premolar), of the trunk (fragments of ribs and rachis) and of the lower limbs (undetermined foot fragment). Finally, the strong similarities between the burials 1618 and 1574 lead us to assume that the two structures served similar functions and were both primary individual burials of immature individuals.

Biological data

The few bone fragments found in the internal fill of the burial 1618 were studied on the assumption that they belonged to a single individual originally deposited in a primary position and disturbed by an episode of looting. The sex of the buried subject is indeterminable given his young age. As for the estimation of the age at death, the poor conservation and the poor representation of the skeleton do not allow us to propose a bone age. However, the presence of a single tooth fragment allows us to estimate a dental age between [10.5m - 1.5y] (Al-Qahtani, 2012). All precautions must of course be taken with this estimate, based on a single tooth fragment, but it allows the individual to be placed in the same category of young immature as the individual buried in the neighboring burial 1574.

Artefacts

Some artefacts were discovered in the internal and external fillings of the burial. In the internal filling, associated with the human bones, were two small carnelian beads (Fig. 15). The first bead, 1 cm long, has a circular section, while the second, 2 cm long, has an almond shape. In the outer filling, in the north corner of the burial pit, between the terracotta basin and the pit wall, a small complete ceramic bowl was found in the primary position (Fig. 16). It probably constituted an offering deposited at the same time as the installation of the structure and the deposit of the deceased. The bowl is of Isin-Larsa tradition (Coppini, this volume).

***Fig. 15** – Carnelian pearls found in the tomb 1619.*

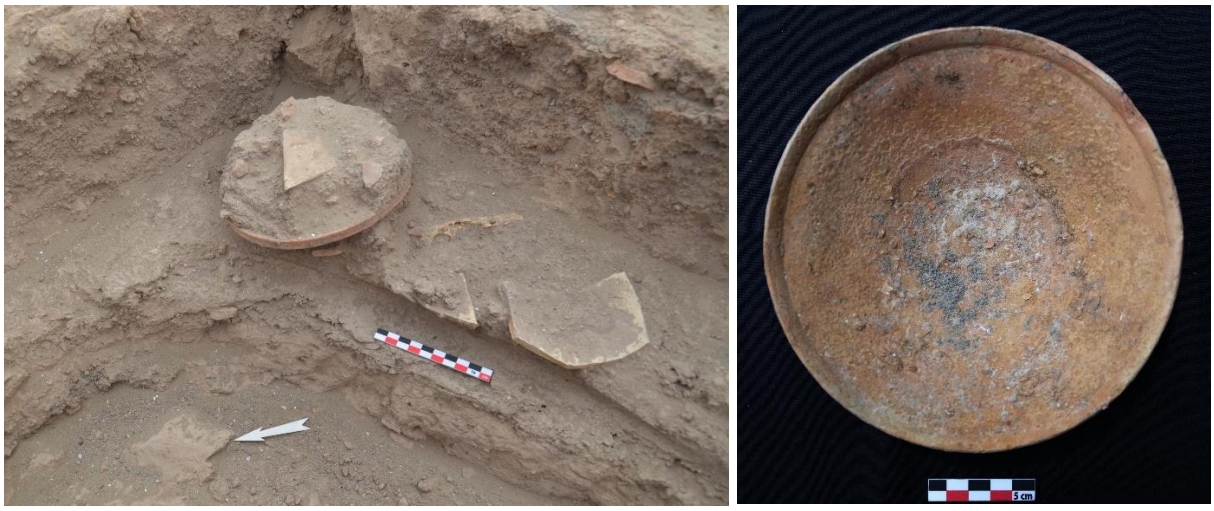

Fig. 16 *– Ceramic bowl found in its initial position in the tomb 1619 (left) and cleaned (right).*

Synthesis

The two burials close both spatially and in their shapes, appear to form a small, coherent series within the local occupation sequence. The absence of associated floors above the tombs, due to erosion, is regrettable, but the altitudes of the tombs, the intersection of burial 1574 with the mud-brick wall 1619 and the incompatibility of tomb 1618 with building B48 provide guarantees on their stratigraphic position. The study of the rare furniture associated with them allows us to relate these two tombs to the Isin-Larsa period, and the excavation of two rooms of building B48 during the 2021 campaign made it possible to ascertain that this building dates from the same period.

The bibliography linked with the study of burials in the region also tells us that children's or adults' burials associated with terracotta coverings are frequently found in the Old-Babylonian levels of the neighboring sites and were notably excavated and documented by L. Woolley at Ur on several occasions (Woolley 1928, Woolley and Mallowan 1976). He then speaks of « Larnax grave » and describes the terracotta vats covering the deceased as « clay larnax » (Woolley 1928: 6), thus taking over the Greek word that was then used to designate a type of small, closed coffin or box made of terracotta and often used as a container for human remains in Greek and Minoan archaeological contexts. This type of burial is sometimes accompanied by the deposit of domestic crockery and has been discovered repeatedly in the context of habitat, notably under the floor of houses (Peyronel 2000: 178, Frank 2008).

The two burials 1574 and 1618 thus present all the characteristics of primary burials of immature individuals typical of the Isin-Larsa/Old-Babylonian habits and customs of the region. If these tombs of young children fit into the normality of the functioning of a large residence of the Old-Babylonian period, they allow us to wonder whether, as in similar contexts, other occupants of the house are also buried nearby, or even in the house, as in a family vault for example. This possibility, already seen at the site of Larsa (Huot 2003), could be one of the avenues of exploration for future excavation campaigns, on the building B48, but also on the nearby building B49, whose excavation in 2021 has already revealed the scientific potential and which resembles B48 in many ways.

VII – The residence of Etellum: excavation of Building B49 in Larsa

Antoine Jacquet and Tahir Kwin Anid

***Fig. 1** – Aerial view of Building B49, from the West (2021).*

The ensemble of the two houses B48 and B49 was first identified in the early 1980s, during a surface survey that partly revealed both the plan of large buildings comparable to those of the Old-Babylonian houses then excavated in the north-east of the site (B27 and B59), and a large amount of Old-Babylonian ceramic material (Huot, Rougeulle and Suire 1989). The excavation of B48, the smaller of the two buildings, was undertaken during the autumn 2019 campaign, where it was possible to excavate room 1515 as well as earlier structures at the southern corner of the house and along its north-east side (Bachelot, Charpin, Murad and Abd-el-Ali 2020). The exploration of B48 continued in November 2021 with the excavation of the two rooms 1531 and 1538, which confirmed the Old-Babylonian dating of the ensemble (Jaccard, Coppini this volume).

The excavation of house B49, which is clearly contemporary with B48, consisted of two separate operations carried out in parallel in November 2021. On the one hand, it was necessary to uncover as much of the building plan as possible (Fig. 1). On the other hand, it was possible to select a few locations for their apparent interest and to excavate them entirely; these are four in number: rooms 1617, 1578, 1595 and 1598. The latter has yielded several dozen tablets and fragments of cuneiform tablets which made it possible to date the final destruction of the house to the end of the reign of King Abi-sare (around 1895 B.C.) and to identify its last occupants, the family of Etellum, Grand Vizier of kings Gungunum and Abis-sare (Charpin and Jacquet, this volume).

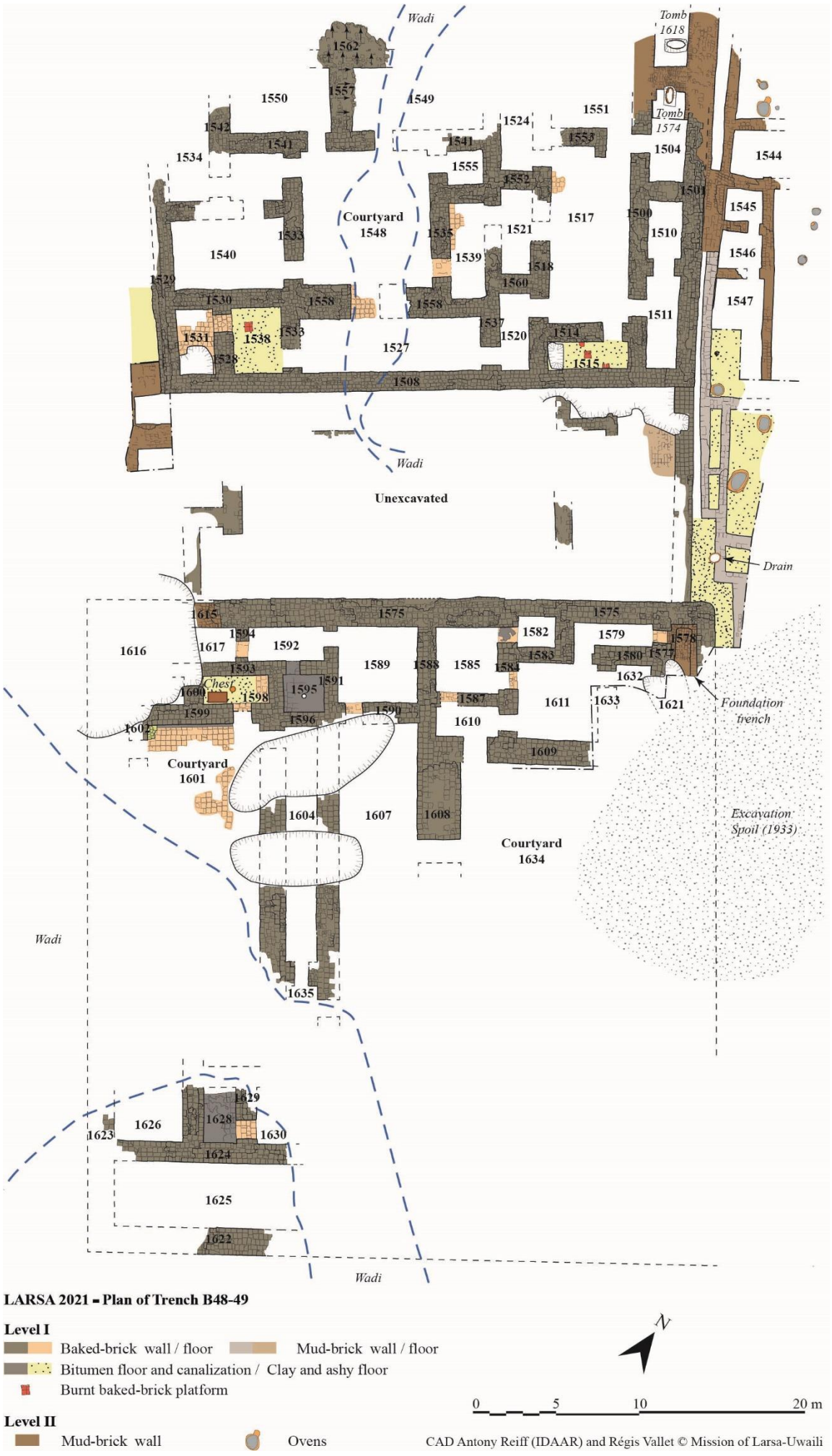

Fig. 2 – General plan of Trench B48-49 (2021).

The residence of Etellum (level I)

The clearing of the plan of this large rectangular house (37 m by 40 m, 1480 m2) occupied the whole of the 21 days spent in the field. The corners orient the building, following the common practice in Mesopotamia. Its northeast quarter and the east corner are covered by a large sand dune (accumulated over the excavation spoil of 1933), which only reveals a small part of the northeast façade. The bed of a wadi, which has almost completely washed away the southeastern and southwestern façades, up to the western corner, as well as the adjoining rooms, also crosses the southern half of the building. Several ancient looters' pits were also found. Therefore, the plan obtained during the excavation is very partial (Fig. 2).

The first step was to clear the northwest façade, the only part of the building that was above ground before the start of operations. This revealed a series of small rooms, courtyards and corridors throughout the northwestern quarter of the building and a few meters of the northeastern façade to the north. Then, we concentrated on the southern corner of the building, whose presence was discernible on the ground surface, beyond the bed of the wadi. The fragments of the southeast and southwest façades thus uncovered are sufficient to restore the perimeter of the complex.

The building is composed of powerful walls of 3 to 5 courses of bricks (up to 1.7m wide) capable of supporting, in places at least, a floor or terraces. It rests directly on an older building built in mud bricks, whose plan it partially follows, at least in its northern part (see below). The walls, often preserved in several courses above the ground and the foundations, are carefully arranged. These courses of fired bricks must have been topped by mud-brick walls, which have now completely disappeared. Two different brick modules were used depending on the location: a rectangular module of 36×28 cm and a square of 33×33 cm, with a thickness of about 8/9 cm. Several rooms are tiled with fired bricks (rooms 1595, 1598, 1628; courtyard 1601) and the use of bitumen plaster in the rooms or on the thresholds is frequent (rooms 1595 and 1628; thresholds between 1582 and 1585 or between 1592 and 1617). All this testifies of a high standard of construction.

The ceramics found during the excavation of the rooms are Old-Babylonian (Isin-Larsa) in their entirety (Coppini, this volume). The tablets and fragments found in room 1598, associated with ceramic material from the Isin-Larsa period, allow us to date more precisely the last phase of occupation of this large private house, as already mentioned, from the reigns of the Larsa kings Gungunum and Abi-sare (Charpin and Jacquet, this volume). Given the remains of ash and burnt wood found everywhere during the excavation, it is very likely that the building was destroyed by fire at the end of the reign of Abi-sare, around 1895 B.C. (Fig. 3).

Fig. 3 *– Ashy layer below the collapse level in room 1595 (detail).*

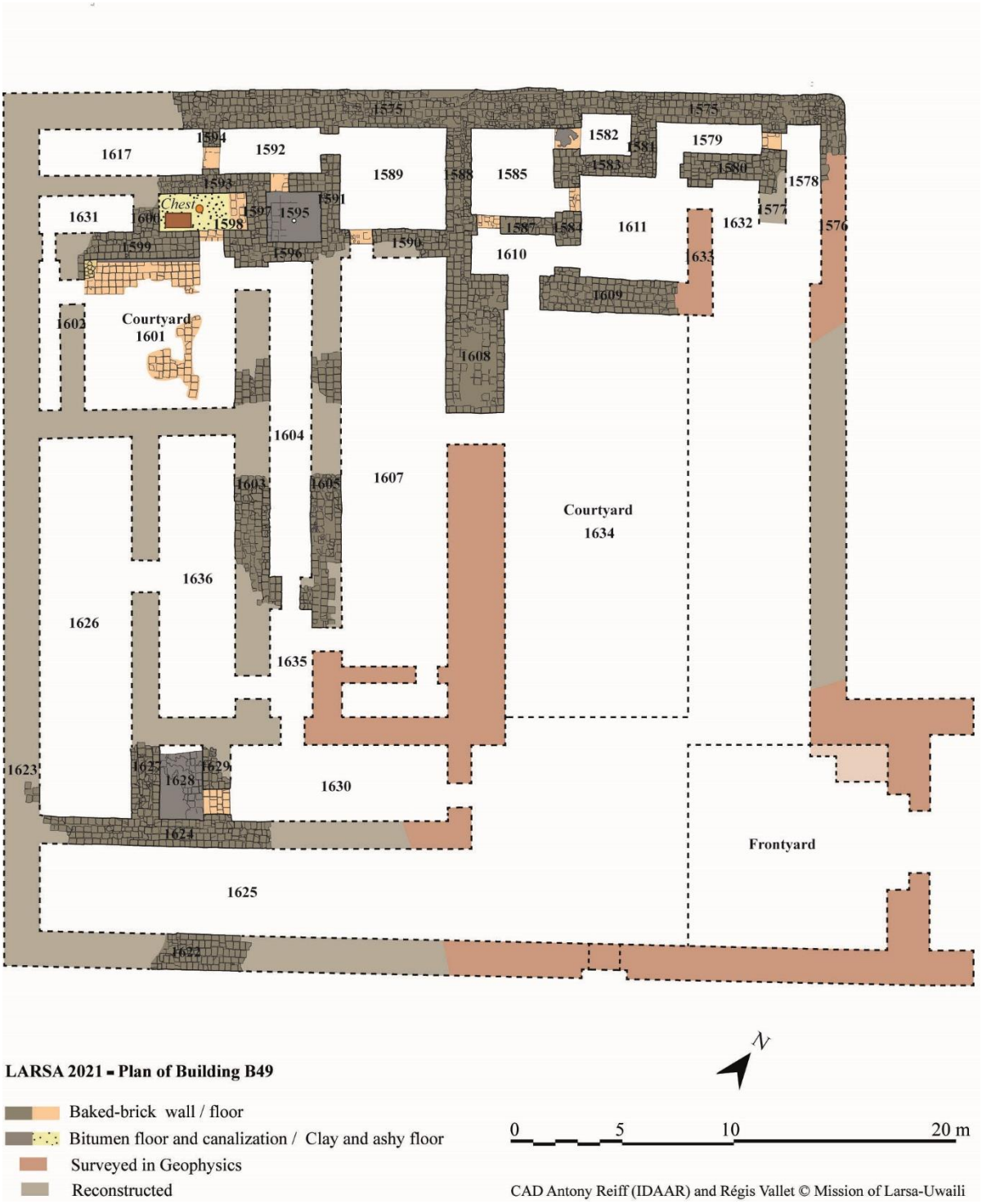

***Fig. 4** – Plan of Building B49, partly reconstructed (2022).*

The work of R. Vallet and A. Reiff on the plans has made it possible to propose reconstructions that give an overall view, based on the preserved alignments and geophysical imagery, of almost three quarters of the residence (Fig. 4). The plan of the eastern wing of the house remains to be clarified. However, geophysical imagery indicates that the building was accessed through a monumental entrance on the northeast façade, at the eastern corner of the building. The entrance must have opened onto a first room or frontyard, which was not uncovered by the excavation. However, the main courtyard of the house must have been the long rectangular space 1634, oriented south-east/north-west, which gave access, to the north-west, to the north wing of the building, a group of small rooms, rectangular or square, organized around the space 1611. The courtyard 1634 also gave access, to the south-west, to the rectangular room 1607 (4.6m wide), the

largest in the house, in a central position in the building. From there, access was gained through the vestibule 1635 to a series of large rectangular rooms in the south wing of the residence: rooms 1636 and then 1626 on the south-west façade, rooms 1630 and then 1625 on the south-east façade. The long corridor 1604 led to the west wing of the house, organized around the small paved courtyard 1601 near the south-west façade. In this relatively protected area, at the opposite corner from the entrance to the house, was the "archive room", which was discovered in room 1598. Finally, the large central room 1607 provided access to a series of three small, adjoining rooms, which were completed by the "bathroom" 1595 in the west wing on the north-west façade.

In the absence of explicit archaeological material and perhaps because of the destruction of the building by fire, it is currently difficult to attribute specific functions to the various spaces with any certainty, other than through parallels (e.g. Battini-Villard 1999, Jahn 2005). Nevertheless, the broad outlines of the general economy of the building are already discernible. The vestibules are to the east, the huge room 1607 most certainly had an ostentatious reception function, and the large family living rooms are behind it, to the southwest. The utility rooms are probably to the southeast (perhaps with a service entrance), and the more private rooms to the northwest. It will be one of the objectives of future campaigns to clarify this scheme by continuing the extensive clearing of B49.

***Fig. 5** – In situ ceramics along the southwest wall of Room 1595 (left), the room seen from the north (right).*

The bathroom 1595

The excavation of locus 1595 revealed a small, almost square room measuring 2.43 m in length and 2.27 m in width. A threshold in the western part of the northwestern wall (1593) provided a passageway from corridor 1592 directly adjoining the northwestern façade of the building. Under the aeolian deposit, a thick layer of collapse and fire rich in ash and ceramics lay on a concave floor covered with terracotta tiles of about 30 cm square and covered with a uniform 2 cm thick layer of bitumen. Three ceramics were found in situ on this bitumen floor along the south-west wall (1597). All three are from the Isin-Larsa period (Fig. 5, left). At the lowest point of this steeply sloping bowl floor, a 6 cm diameter hole was discovered. This hole was fitted with a ceramic cylinder that opens onto a large void located under the room, more than 5 m deep and of undetermined width. The concave bituminous floor associated with the presence of this vertical drain must have allowed for the easy evacuation of liquids and makes this room a probable bathroom (Fig. 5, right).

Fig. 6 *– The Archive room 1598, from the southwest.*

The archive room 1598

Room 1598 was also carefully excavated. It is a rectangular room measuring 3.93 m in length and 1.71 m in width, located directly to the north-west of 1595, but not communicating with it. A threshold in the eastern part of the south-east wall of the room (1599) connects with courtyard 1601 (Fig. 6). The walls had a maximum of three courses in the east and two in the west. The filling was heterogeneous: a first level of collapse located against the north-west wall of the room (1593) was identified, consisting of nodules of melted mud bricks. It partly covered a large level of collapse and fire, spread over the entire surface of the room. This level, with an average thickness of about 20 cm and extremely rich in charcoal and rubbish nodules, contained a large quantity of ceramic shards, animal bone and above all fragments of highly degraded cuneiform tablets dated to the reigns of Gungunum and Abi-sare (Charpin and Jacquet, this volume).

Fig. 7 *– Room 1598. Left: remains of burnt furniture, a reed basket (bottom left) and a wooden chest (right). Right: fragments of cuneiform tablets in situ among ceramic debris.*

On the east side of the room, the level rested on a tile floor made up of terracotta tiles measuring about 30 cm on each side, whereas, on the west side, it rested on a homogeneous surface of beaten earth, which yielded the remains of charred furniture (a chest), a reed basket (Fig. 7, left) and some

ceramics in situ that had certainly contained the tablets (Fig. 7, right). All of these layers were subjected to a very significant drawdown effect at the threshold, perhaps linked to the collapse of an underground architectural element (a large pipe or a tank linked to the adjoining bathroom?).

An old house under the house of Etellum (level II)

Two excavated areas revealed fragments of an ancient mud-brick building on which the Isin-Larsa building rests, at locus 1615 along room 1617 on the one hand and at locus 1612, under the floor of room 1578 on the other.

***Fig. 8** – Room 1578, from the northwest, with wall 1612 of level II, cut by the foundation trenches of B49.*

Room 1578 and wall 1612

In the northern corner of the building, directly below the floor of room 1578, a mud-brick wall following a southeast/northwest axis was uncovered, locus 1612 (Fig. 8). It consists of at least ten courses of rectangular mudbrick (it seems to continue under the northeast façade 1576 of B49), of 25x15cm, and must have been the northeast façade of a former large residence (level II). It may have been the continuation of the one discovered under B48 further north, also provided with a similar huge wall. In any case, the facades of the house of Etellum (1575 and 1576) do not rest on this older wall, but in foundation trenches that cut deeply into it. The two levels were intersected, to the southeast, by a pit (1621) where pottery and animal bones of Old-Babylonian date were found. To the west, just opposite the entrance of the room, the foundation trench of wall 1577 was here filled with good mudbricks. They were part of a flight of a few steps (largely destroyed in the passage) intended to make up for the difference in altitude between the floors of the room and those of the lower corridor 1579 which gave access to it.

Room 1617 and wall 1615

A search for the western corner of the building, destroyed by a large pit (1616), revealed the threshold and two corners of room 1617, directly accessible under a thin layer of aeolian filling. Traces of fire are also clearly visible here (presence of ashes and burnt bricks). The remains of a

thick layer of bitumen found on the threshold and in the two preserved corners of the room, the traces of which were also visible on the first layer of fired bricks, indicate that the entire room must originally have been covered with bitumen (Fig. 9).

Fig. 9 *– Preserved part of room 1617, showing remains of a bitumen floor, from the west.*

Above all, a powerful mud-brick wall (1615) was found just below the northwest facade of B49 (1575), whose inner face was in line with it, its external face sticking out the older wall of about 0.2m (Fig. 10). The remains of this ancient wall, which was five rows wide (1.45m) of rectangular bricks and preserved in at least two courses, were revealed over a length of almost one meter. Its foundations have not been searched. This powerful wall shows that the large Level II construction attested further east of the trench probably continued to this point (i.e., at least 30 m long), and that B49 partially reused its alignments as foundations.

The ensemble is cut, on the south-west side, by the large pit 1616, full of ceramic material of the Kassite period, mainly goblets (Coppini, this volume).

Fig. 10 *– Mudbrick Wall 1615 of level II under the north façade of B49 (wall 1575), from the west.*

VIII – Preliminary report on the 2nd millenium pottery of Larsa

Costanza Coppini

***Fig. 1** – Range of surface colours, B50 (2019).*

During the 2021 excavation campaign the work on 2nd millennium pottery was twofold: 1) analysis of the pottery from the 2019 excavation in B50 (henceforth B50 2019), based on the preliminary work carried out by Valentina Oselini in the 2019 report (Oselini and Herr 2020), and 2) the work on the material from the last excavation campaign, during which works were carried out in trenches B48, B49, B50 and PZ (henceforth B48 2021, B49 2021, B50 2021, PZ 2021). Two different workflows have been used for the 2019 and the 2021 material. The material from B50 2019 was treated as following: 1a) drawing of a selection of the ceramic material;[1] 1b) photography of all contexts (*numéro vert*); 1c) processing of all contexts. This last step was aimed at collecting all possible data about the pottery assemblages and for this aim data were registered in an Excel worksheet, subdivided into different entries: apart from the year of excavation, the trench, the *numéro vert* and the number of each sherd, technology- and shape-related categories were included in the worksheet. The technology-related categories are external surface colour, internal surface colour, fracture colour, fabric, surface characteristic, surface treatment, manufacturing technique, and firing. The shape-related categories are vessel shape, rim shape, neck shape, spout, handle/lug/suspender, base shape, decoration. Another part concerns the measurements (thickness, rim diameter, base diameter and size group) and the chronological determination. For the 2019 material, the primary aim was to define the chronology, the shapes typology, and the technological characteristics of B50 ceramic assemblages.

[1] Complete or archaeologically complete vessels were drawn, while sherds were selected on the basis of the occurrence of the types in each context, i.e. *numéro vert*.

The workflow for the ceramic material from the 2021 ongoing excavation in B48, B49, B50 and PZ was the following: 2a) drawing of a selection of the ceramic material; 2b) photography of all contexts; 2c) registration of all contexts; 2d) partial processing of contexts. The primary aim was to delineate the chronology of the phases brought to light in each trench.

***Fig. 2** – Fabrics of the pottery from B50 (2019).*

Pottery from B50 (2019)

The ceramic assemblages from the 2019 excavation in B50 have been recovered in the rooms excavated in the building, which may have had a religious character (Obreja et al. 2020, 78). The ceramic assemblage is characterized by light colours on the external and internal surface (white, yellow, pink, buff), and darker colours in fracture (brown, buff, orange and red) (Fig. 1). Fabrics (Fig. 2) belong to three main categories, classified on the base of the main component of the fabric: 1) mineral, 2) sand, 3) vegetal. Each main category is subdivided into sub-categories, according to the inclusions associated to the main component of the fabric (Table 1).

Main category	Sub-category
Mineral	Mineral, sand (Fig. 2a)
	Mineral, vegetal (Fig. 2b)
Sand	Sand, few mineral
	Sand, mica, calcite, few vegetal
	Sand, few vegetal
	Sand, mineral (Fig. 2c)
	Sand, vegetal (Fig. 2d)
Vegetal	Vegetal, few mineral
	Vegetal, few sand
	Vegetal, mineral (Fig. 2e)
	Vegetal, sand (Fig. 2f)

***Table 1** - Fabrics in the ceramic assemblages of B50.*

The largest part of the material (Fig. 3) presents a sand-based fabric (82.03%), and the rest is subdivided into vegetal (17.12%) and mineral fabrics (0.85%). Sand-based fabrics occur mainly with mineral inclusions (calcite and mica). Vegetal-based fabrics are associated with a low presence of mineral inclusions (calcite and/or mica). In general, pottery from B50 presents a self-slip and its external surface is smoothed.

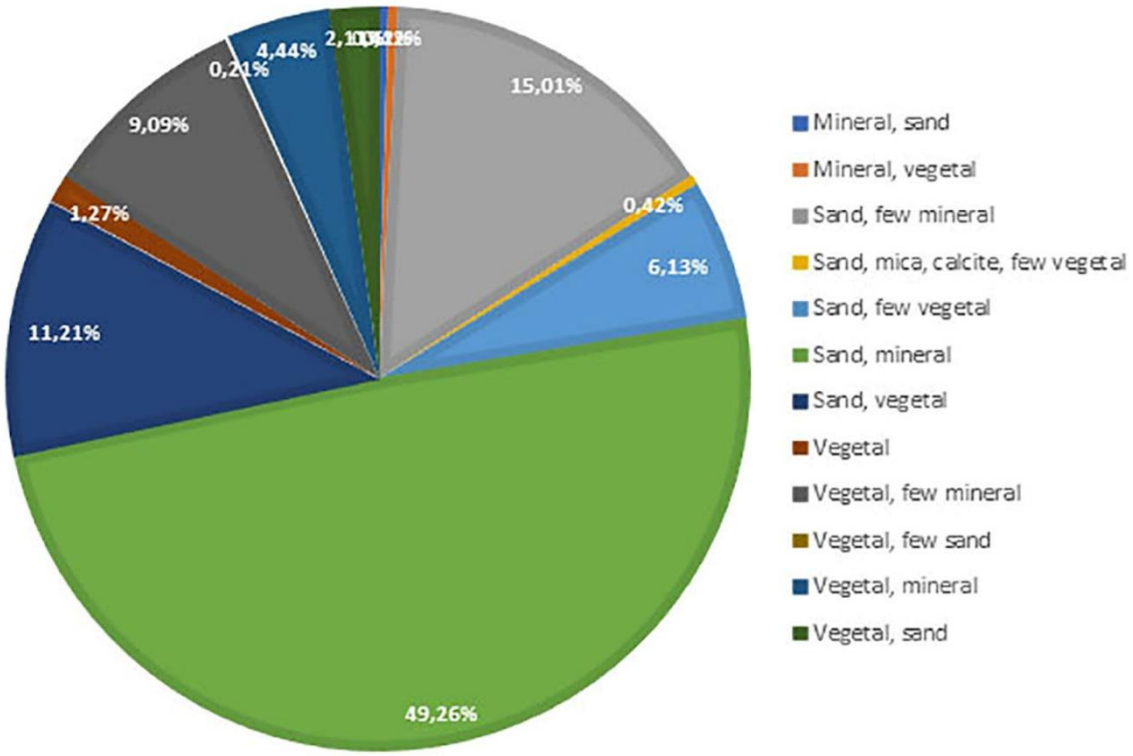

Fig. 3 *– Percentage of fabrics attested in B50.*

The ceramic material from B50 is very homogeneous, mostly falling in the sphere of closed shapes (498). These are mainly jars (317), though also drinking vessels are widely represented (108). Besides these two shapes, big size containers (36) and deep vats occur as well (29). Open shapes (188) occur as wide platters (9) and bowls (179). In this analysis of the ceramic material, the assemblages from Room 3019 and 3032 will be considered.

Rooms 3019 and 3032: a typological, chronological and functional analysis

The most representative ceramic sequence for B50 comes from Room 3019, where a deep sounding was carried out (Vallet 2020: 11)[1] and from Room 3032, located to the south-east of Room 3019 and running parallel to it (Vallet et al. 2020, fig. 20). Moreover, a large modern pit (Vallet et al. 2020: 151), heavily disturbed Room 3019, one of the biggest room of the building among those excavated in 2019.

The largest part of the ceramic material consists of jars with long and flaring neck, outside thickened, thin ribbon rim and ovoid body (Fig. 16.2). This type is very frequent in southern-Mesopotamian sites in the 19th and 18th centuries; thus, comparisons are attested with Group 250 A2 (Armstrong and Gasche 2014, pl. 110-111), therefore with the sites of Sippar (Zuhair 2009,

[1] The sounding reached the foundations of the building in its north-eastern corner (Vallet et al. 2020: 151). Given the nature of the filling, it has been hypothesized that the layers of packed earth alternating with layers of broken mudbricks resulted from the destruction and levelling of the structures of the building's first floor (Vallet et al. 2020: 151).

pl. 47.1-3) in the Northern Alluvial Plain and Telloh (De Genouillac 1936, pls. 111.26 and XXVIII.3201) in the Southern Alluvial Plain. In the site of Larsa, this same type was found in the Old-Babylonian buildings B27 (Calvet 2003, fig. 53, B27.128), and B59 (Calvet 2003, fig. 69, 59.61-62) in the north sector of the site.

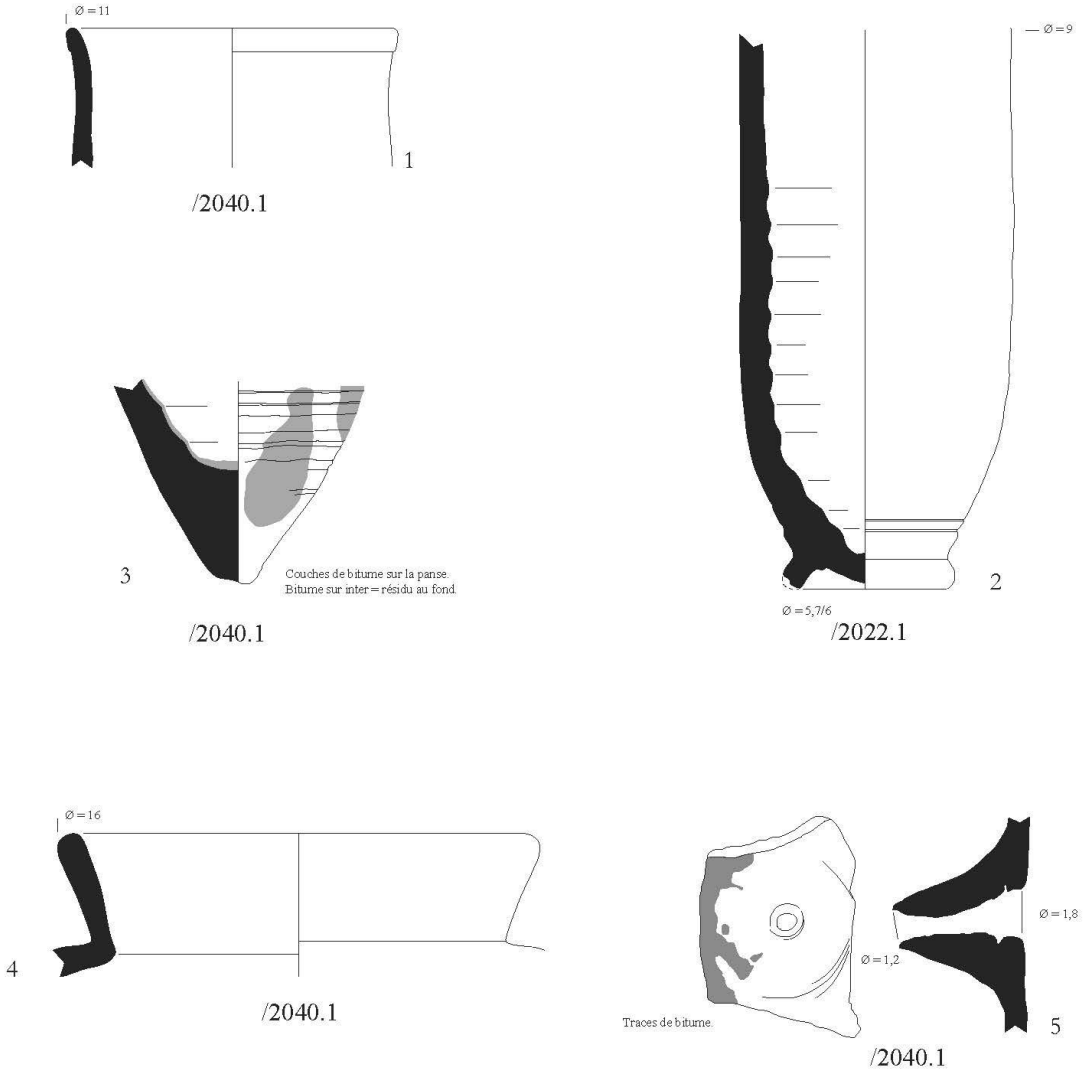

***Fig. 4** – Ceramic assemblage from Rooms 3019 and 3032.*

The second most attested category are drinking vessels, which occur as the typical 'Larsa' goblet or with short neck and cylindrical or ovoid body. 'Larsa' goblets (Fig. 4 and 5), which present a sinuous profile and a ring base, are widely attested in the Southern Alluvial Plain, not only at Larsa itself but also at Uruk, Ur and Telloh, and are dated to the 18th – beginning of 17th cent. BC (Armstrong and Gasche 2014: 38). At the site of Larsa, they have been found in B27 (Calvet 2003, fig. 46, 27.160; fig. 48, 27.110 and 118; fig. 52, 27.278; fig. 57, 27.546 and 563) and in B59 (Calvet 2003, fig. 64, 59.43-42; fig. 67, 59.55), and in *niveau* 1, 2 and 3 of the sounding J VIII (Calvet et al. 2003, fig. 12-13). The type of the goblet with short neck and cylindrical or ovoid body and convex base (Fig. 6) are attested in the 18th and 17th century in the Southern Alluvial Plain and finds comparison with Group 230 A3 and A4 (Armstrong and Gasche 2014: 64, pl. 106), and in Isin (Hrouda 1987, Taf. 26.8, 30.14). In Larsa this type occurs in B27 (Calvet 2003, fig. 55, 27.503-501; fig. 57, 27.567) and in Sounding J VIII *niveau* 1 and 2 (Calvet et al. 2003, fig. 14).

Fig. 5 *– 'Larsa' goblets from Rooms 3019 and 3032.*

Fig. 6 *– Convex bases of short neck goblets from Rooms 3019 and 3032.*

***Fig.** 7 – Bowls from Rooms 3019 and 3032.*

Open shapes are mainly attested as bowls, which occur with conical wall and simple rounded or inward rim, and with profiled rim. A sand-base fabric, with few vegetal inclusions (Fig. 7), characterizes these types. The conical bowl with simple or inward rim, which usually presents a string-cut base, are attested in Southern Mesopotamia, both in the Southern and Northern Alluvial Plain and are chronologically significant between the 20th and the 18th cent. BC.[1] Comparisons can be found in Isin (Hrouda 1987, Taf. 30.16; Hrouda 1977, Taf. 27, IB 241a) and Larsa itself (Calvet 2003, fig. 47, 27.75; fig. 60, 59.84; fig. 63, 59.27, 150; fig. 69, 59.65). Bowls with profiled rim are common in the 20th to the 18th cent., starting at the end of the 3rd millennium, i.e. in the Ur III period. This is attested by comparisons with sites in southern Mesopotamia, such as Sippar (Zuhair 2009, pl. 58.5), Tell ed-Der (Gasche 1984, pl. 10.3-7, 12.2-4, 13.1), Uruk (Boehmer et al. 1995, pls. 6.c1-c4, 9.a-c, g-I; Van Ess 1988, fig. 4.44).[2] Wide platters are present in very low percentage in the assemblages from Room 3019 and 3032. The most common type is the wide platter with inside thickened beveled rim, straight wall and flat base: it is dated to the 18th and 17th cent. BC, as it is attested by comparisons with Group 5 C1 (Armstrong and Gasche 2014, pl. 4). In Larsa they are attested also in the Old-Babylonian buildings B27 (Calvet 2003, fig. 49, 27.533; fig. 56, 27.556) and B59 (Calvet 2003, fig. 65, 59.80).

Summing up, the occupation and use of B50 took place between the 20th and the 17th cent. BC. This suggests that the building was in use not only in the period of the hegemony of Larsa as a

[1] The type does not disappear in the late Old- Babylonian and in the Kassite period but it is characterized by a fabric with numerous vegetal inclusions and more visible mineral inclusions, such as calcite.

2 It must be remarked that the bowl type with profiled rim is very frequent in the end of the 3rd millennium BC in whole Mesopotamia, from the Khabur region in northeastern Syria through the Diyala and Hamrin valleys and to the Southern Alluvial Plain. Although here it continues into the beginning of the 2nd mill. B.C., in northern Mesopotamia it ceases to be attested around the 19th cent. B.C.

political centre (20th – first half of 18th cent. B.C., so-called Isin-Larsa period), but also after its conquest by Babylon (Table 2). At present, it is not possible to ascertain if in the building the same internal layout was preserved in both periods, without altering its function and meaning in the urban structure of Larsa.

Type	Chronology
Jars with long and flaring neck, outside thickened, thin ribbon rim and ovoid body	19th- 18th cent. B.C.
'Larsa' goblet	18th- beginning of 17th cent. B.C.
Goblet short neck and cylindrical or ovoidal body	18th- 17th cent. B.C.
Conical bowl with simple or inward rim	20th - 18th cent. B.C.
Bowl with profiled rim	20th - 18th cent. B.C.
Wide platter	18th and 17th cent. B.C.

***Table 2** – Chronology of the ceramic sequence of B50 (2019).*

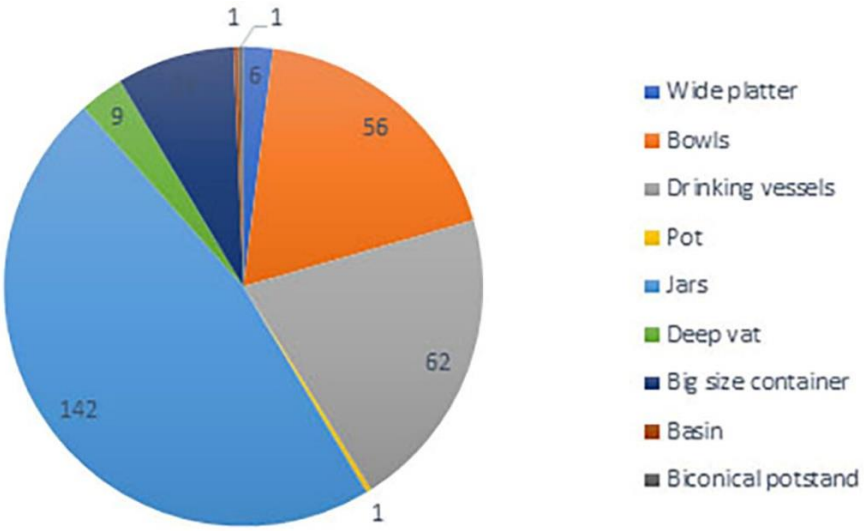

***Fig. 8** – Functional classes from Room 3019.*

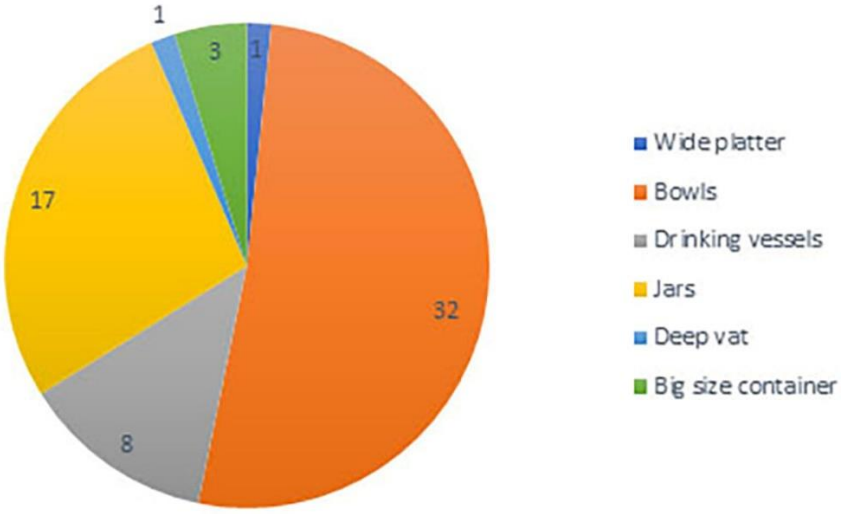

***Fig. 9** – Functional classes from Room 3032.*

However, from a functional point of view it can be asserted that the rooms probably held a different meaning. The assemblage from Room 3019 is constituted by jars, which are almost half of the total, and the rest of the vessels are bowls and goblets (with few platters and big size containers, Fig. 8). Room 3032 shows a reversed situation, where bowls are almost half of the assemblage (Fig. 9).

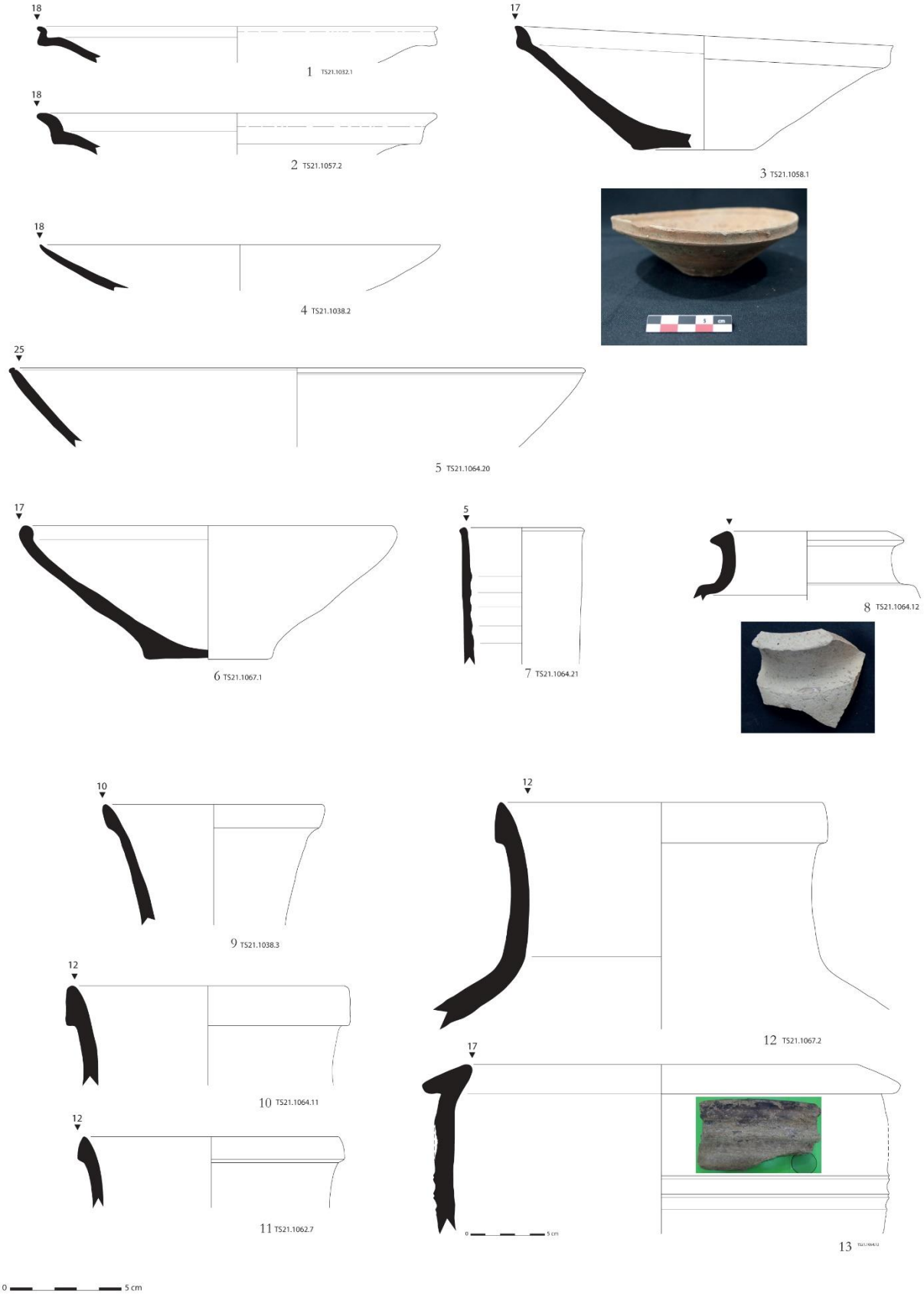

Fig. 10 *– Pottery from B48 (2021).*

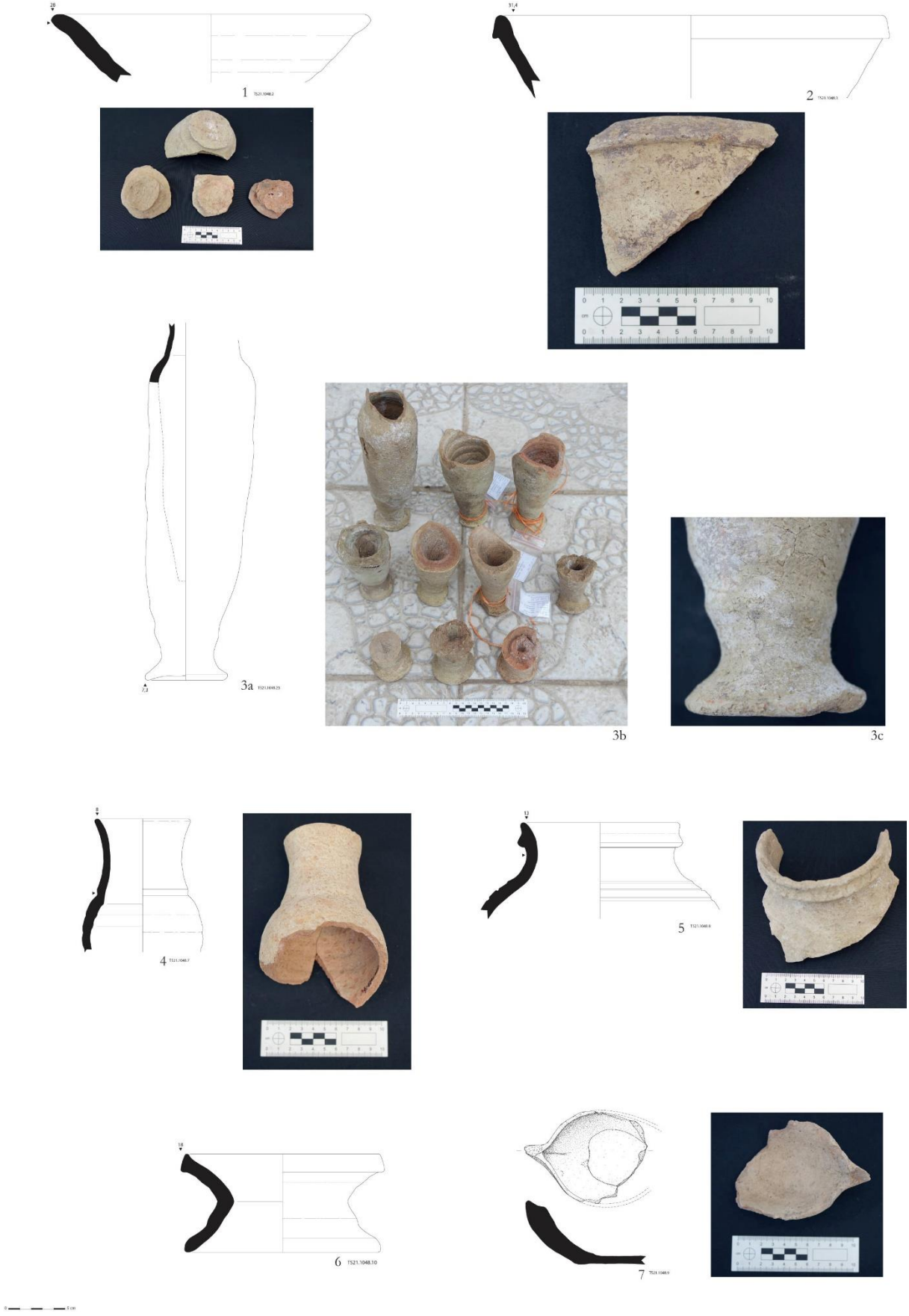

Fig. 11 - Pottery from B49.

A characteristic, which is common to both rooms, is the absence of installations, and Room 3032 is bigger than Room 3019 (12,3 m x 3.9 m *vs* 7 m x 3 m). Given the size of Room 3019 and the nature of the ceramic assemblage, it can be hypothesized that the room was part of the storage facilities of B50. Observing the assemblage from Room 3032 and its size, this leads to think that this part of the building was devoted to food consumption, i.e. to activities involving commensality. It must be remarked that this is a very preliminary consideration, as other elements (architectural analysis, study of botanical remains, and detailed functional study of ceramic assemblage) need to be added to the study of the building.

Pottery from the 2021 excavation

A total of 2372 pottery specimens – both sherds and complete or half-preserved vessels – have been retrieved from deposits, fillings of rooms and structures, and from room floors. The chronological spectrum embraces the whole 2nd millennium, from the Isin-Larsa to the Kassite period. In the following part, the pottery will be described according to the excavation trench and will be followed by a preliminary chronological determination.

The assemblages from B48 and B49

Ceramics from B48 have been found in Room 1531 and 1538, except for the two vats found in the tombs northeast of the building (Jaccard, this volume). The assemblage from the two rooms consists mainly of open shapes, i.e. bowls, while wide platters are absent in this building. Bowls - characterized by a string-cut base - belong to the type with conical wall and simple or inward rim (Fig. 10.4, 6), and to the type with profiled rim (Fig. 10.1-3). Another type of bowls is characterized by a curved and thinned rim (Fig. 10.5). Very low is the number of drinking vessels, which are usually with cylindrical body and short neck, separated from the body by a sharp shoulder (Fig. 10.7-8). Closed shapes can occur as jars and vats. Jars belong to the type with long and vertical neck, and ribbon rim, sharp (Fig. 10.9-12), and to the type with short neck and sharp shoulder. Vats are characterized by the body decorated with ridges and by a bevelled and outside thickened rim (Fig. 10.13): these are the containers constituting the two infant burials found in the building and in the level below.

Ceramics from B49 have been recovered in Room 1578, 1595 and 1598 and from two pits that disturbed the building in its north-eastern and north-western sectors (Jacquet and Kwin Anid, this volume). The north-western pit (locus 1616) contained material dated to the Kassite-period, confirming that the building was no more in use in this period. The assemblage from the pit consists of thick bowls with convex wall and string-cut base (Fig. 11.1), deep bowls with bevelled and thickened rim (Fig. 11.2), Kassite goblets (Fig. 11.3-4), jars with neck and thick ribbon rim (Fig. 11.5), biconical pot stands (Fig. 11.6) and one lamp (Fig. 11.7). In general, it is characterized by a fabric with numerous chaff inclusions and calcite inclusions, with self-slip and roughly smoothed external surface. This ensemble (Fig. 11) mirrors a typical Late Bronze Age ceramic assemblage from central and southern Mesopotamia, i.e. the area of the political rule of the Kassite dynasties. This cluster from pit 1616 finds comparisons with the Kassite levels from Tell Yelkhi in the Hamrin basin (levels II and I, Valtz 2002-2003), besides other sites in southern Mesopotamia. Comparisons with Yelkhi are attested for wide bowls with thick base (Valtz 2002-2003, tav. 141.3), Kassite goblets (Valtz 2002-2003, tav. 151.7-8), jars with neck and thick ribbon-rim (Valtz 2002-2003, tav. 154), and biconical potstands (Valtz 2002-2003, tav. 156).

Fig. 12 - Pottery from B49.

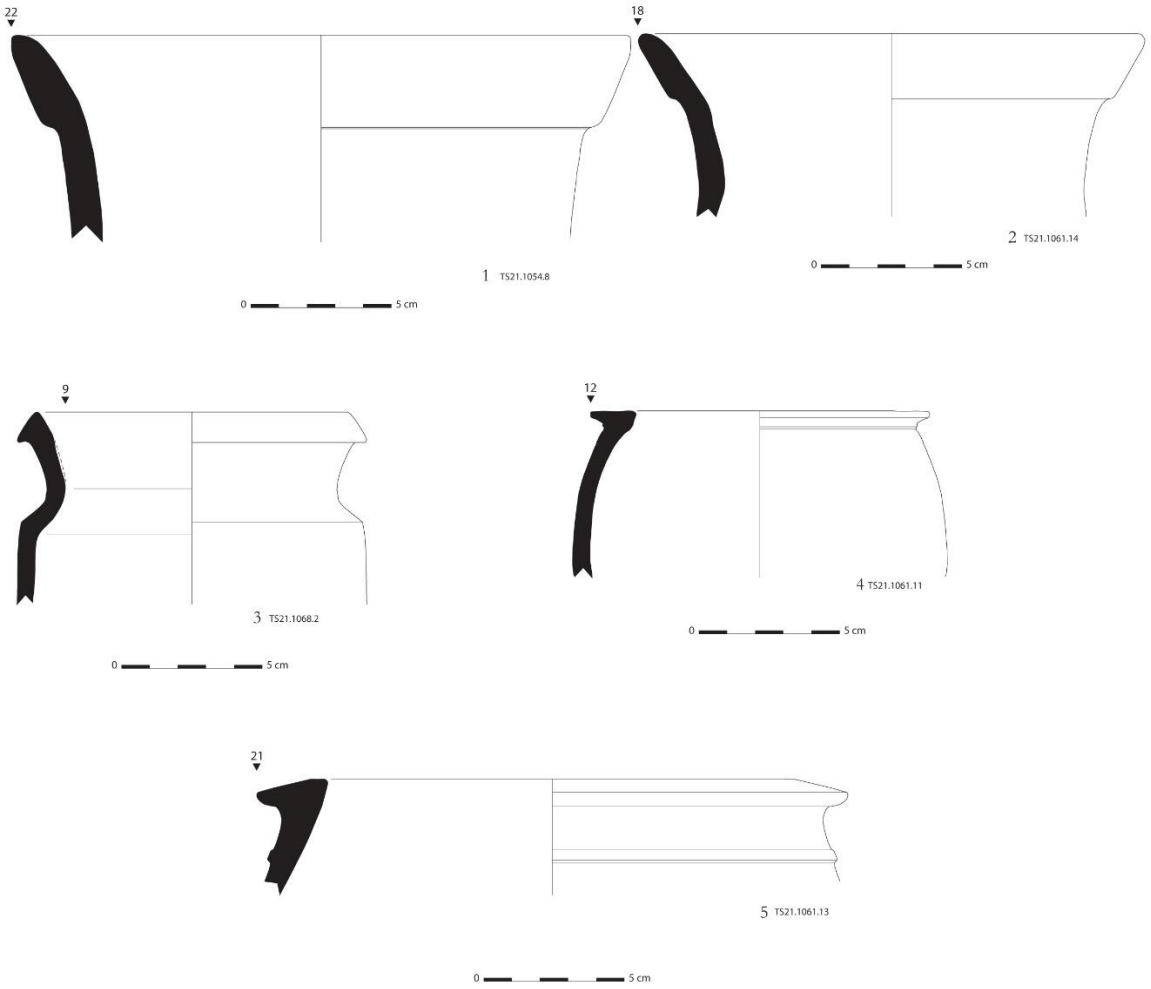

***Fig. 13** - Pottery from B49.*

The material from rooms 1578, 1595 and 1598 is very homogeneous and similar to the material from B48. Open shapes are bowls with conical wall and simple (Fig. 12.1-2) or inward rim (Fig. 12.3-4) and string-cut base. They are associated to 'Larsa' goblets (Fig. 12.5) and goblets with cylindrical body (Fig. 12.7) and short neck, separated from the body by a sharp shoulder (Fig. 12.6). Jars are present in a low quantity and occur with vertical neck and everted, outside thickened ribbon rim (Fig. 13.1-2), associated with jars with short neck and sharp shoulder (Fig. 13.3).

The assemblage from the rooms of building B48 and B49 shares many common traits: the presence of conical bowls with simple or inward rim, the goblets with short neck and cylindrical body and the jars with ovoid body and thin ribbon rim. As already asserted concerning B50 (2019), conical bowls with simple or inward rim and jars with ribbon rim and ovoid body are attested between the 20th and the 18th cent. B.C. Goblets with short neck and cylindrical body are attested in the 20-18th cent. B.C., and find comparisons with Tell ed-Der (Gasche 1984, pl. 15.5, 19.6), Telloh (De Genouillac 1936, pls. XXX.2242, XXXI.1359) and from Larsa Sounding J VIII, *niveau* 2 and 3 (Calvet et al. 2003, fig. 17.b-l). An invaluable support to the chronological attribution of this material is provided by its association in B48, Room 1598, with cuneiform tablets from the archive of Etellum, grand vizier appointed by the Larsa king Gungunum (1932-1906 B.C.), who maintained his role also during the reign of Abi-sare (1905-1895 B.C.), son of Gungunum (see Charpin and Jacquet, this volume). This finding gives the unique opportunity of providing a chronological attribution to the ceramic assemblage from the room, and consequently to that from B48 through comparison, which is very precise: this shows a ceramic assemblage falling in the 20th – 19th cent. B.C.

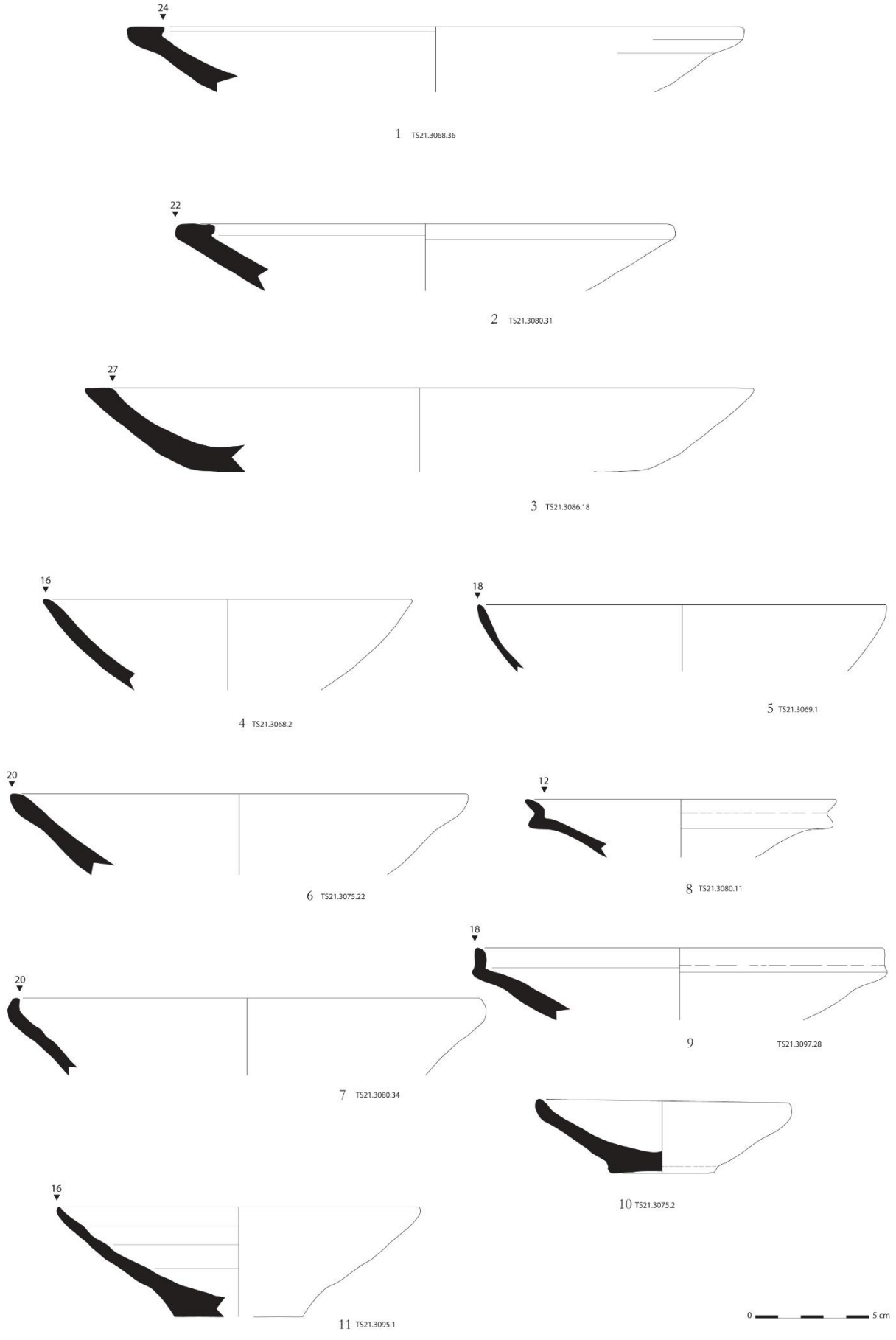

Fig. 14 - Pottery from B50 (2021).

***Fig. 15** - Pottery from B50 (2021).*

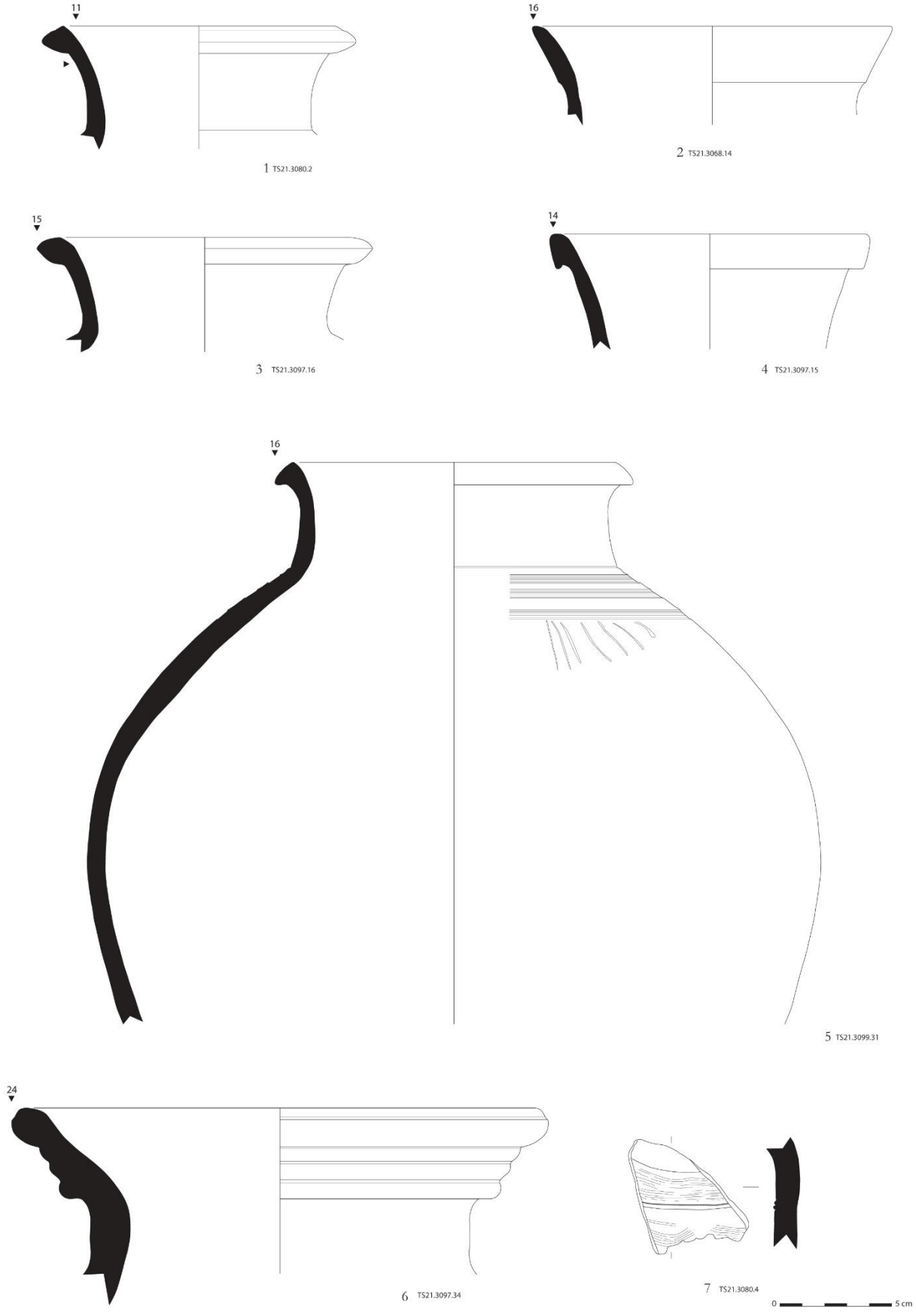

***Fig. 16** - Pottery from B50 (2021).*

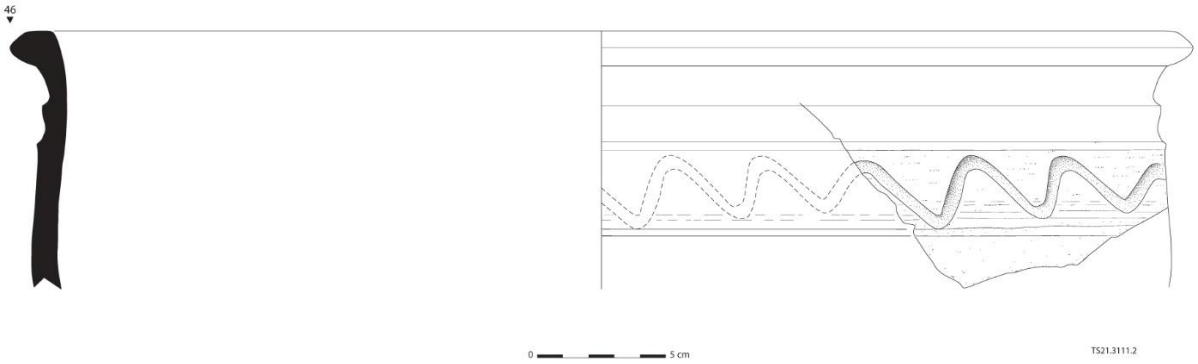

***Fig. 17** - Pottery from B50 (2021).*

The pottery from B50

The pottery from trench B50 comes, in 2021, exclusively from the large mudbrick building, not the late reoccupation of the site. The largest bulk of the material has been found in the excavation of Room 3019, located in the central northern sector of the building (see Ait-Said, Vobauré and Vallet, this volume).

Open shapes are represented in a wide variety. Platters are attested with straight wall and internally bevelled rim, or with simple squared rim (Fig. 14.1-3). Bowls occur with thin and simple rounded rim (Fig. 14.4-6), inward rim (Fig. 14.7, 10-11) or profiled rim (Fig. 14.8-9). Closed shapes are subdivided into goblets and jars. Goblets occur with short neck, ovoid body and convex base (Fig. 15.1-3), and in the shape of Larsa goblets (Fig. 15.4). Jars belong to four types: with long neck and everted ribbon rim (Fig. 16.2, 4); with long neck and everted outside thickened rim (Fig. 16.1, 3, 5); with everted and grooved ribbon rim (Fig. 16.6), and the body decorated with comb-incised wavy lines (Fig. 16.7). Big-size containers are vats with outside thickened and everted rim, and the body decorated with wavy lines (Fig. 17).

This assemblage does not differ from the previously illustrated 2019 ceramics; therefore, we suggest the same chronology for this material. Moreover, fragmentary mudbricks with inscription have been found in the filling of Room 3019, they are dated to the reign of Larsa king Sin-iddinam (1849-1843 B.C.). This supports the ceramic chronology of the building, and provides new hints about the character of B50. In the light of the text of the inscription, which commemorates the work of the Larsa king in the E-babbar, it suggests that the building could be identified with the Gipar, the residence of the priestess of Shamash (Charpin and Jacquet, this volume).

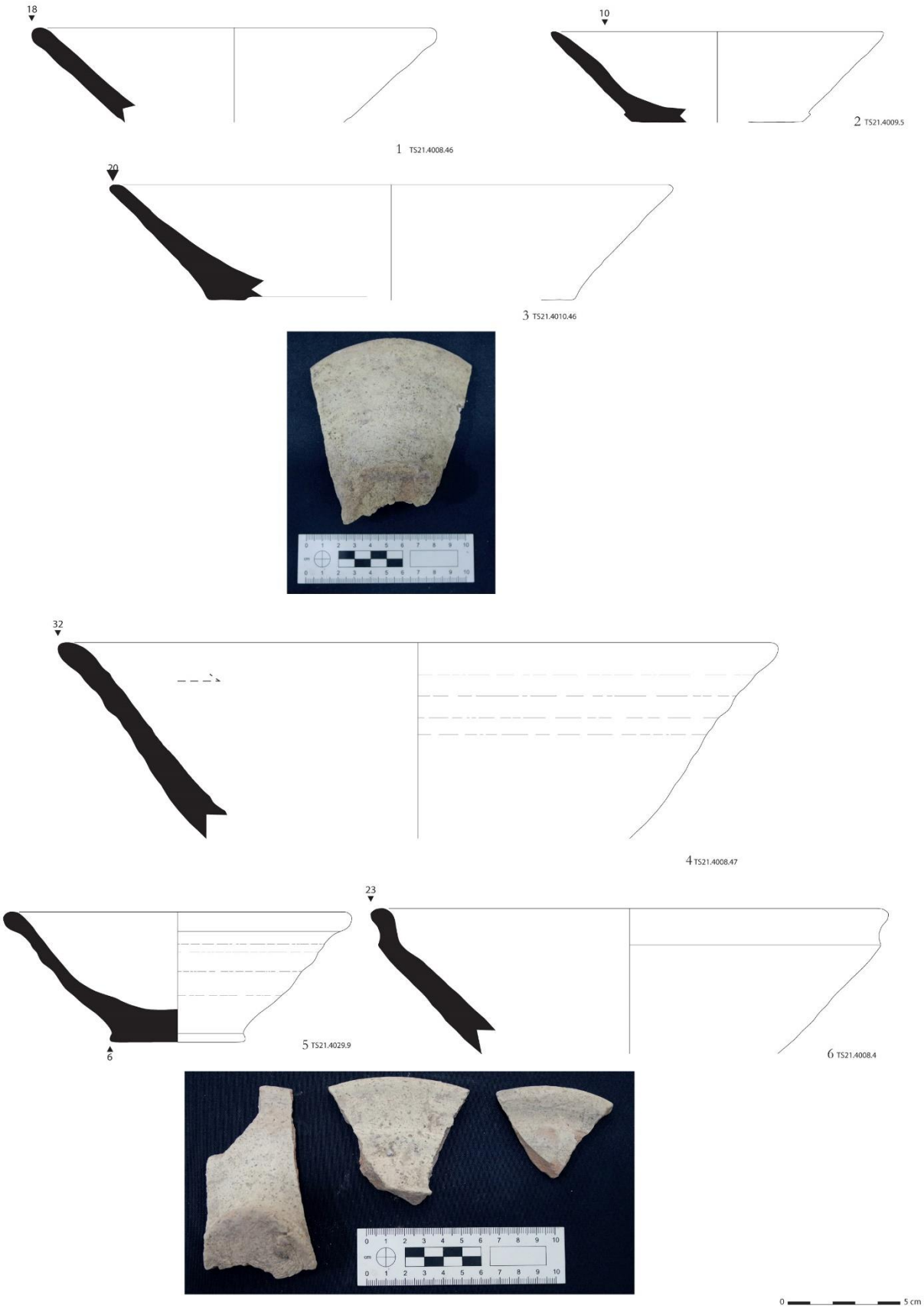

Fig. 18 – Pottery from trench PZ.

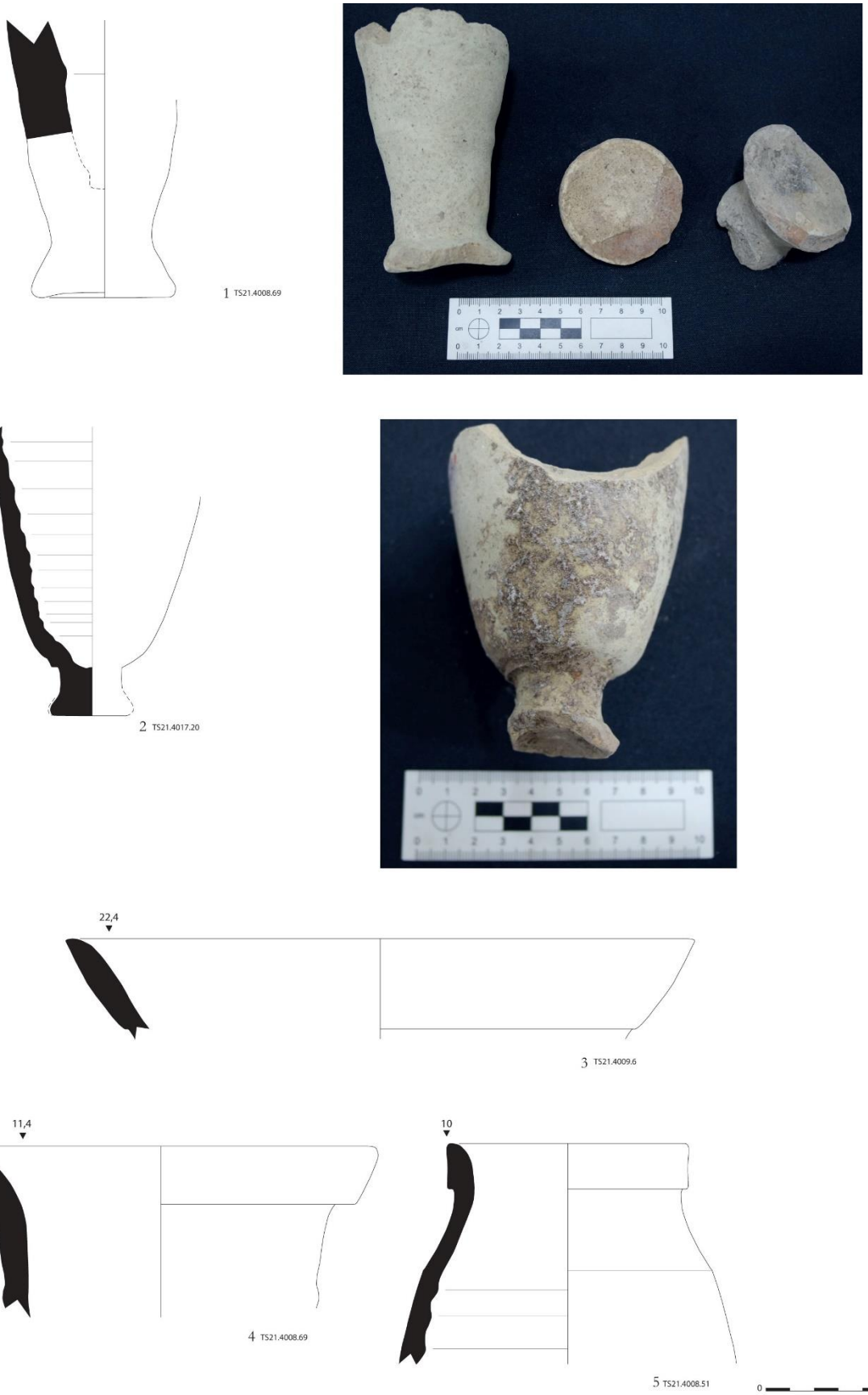

***Fig. 19** - Pottery from trench PZ.*

***Fig. 20** – Pottery from trench PZ.*

Ceramic assemblages from PZ: between the Larsa dynasties and the Kassite rule

The pottery found in PZ comes from the levels of the Kassite artisanal area and from the deposits beneath it and constituting the filling of the Larsa Grand Canal (Zingarello, Bachelot and Hsony, this volume).

The assemblages from the Kassite artisanal area mainly consist of wide bowls with thick base (Fig. 18.1-4) and bowls with high carination (Fig. 18.5-6), both characterized by a chaff fabric, with few calcite inclusions. Drinking vessels can present a thick foot base (Kassite goblet, Fig. 19.1) or a foot base with straight wall (Fig. 19.2). Closed shapes are jars with ribbon and thin rim (Fig. 19.3-4), or with ribbon and thick rim (Fig. 19.5), and short neck. From the lower levels, i.e. those filling the canal, the assemblages show the occurrence of platters with internally bevelled rim or with outside thickened rim and convex wall (Fig. 20.1-2), of goblets with short neck presenting a painted decoration (Fig. 20.3-4) and of jars with thin ribbon-rim and ovoid body (Fig. 20.3). Small jars with painted neck and body are attested in southern and central Mesopotamia between the late 18th and the 14th cent. B.C.: exemplars from PZ are characterized by a dark painted band from the rim to the shoulder and dots on the shoulder, thus falling in the 17th cent. B.C. (Armstrong and Gasche 2014, 52, pl. 81.1,4 and 8). This is corroborated also by the same-type exemplars found in Larsa Sounding J VIII, in *niveau* 1 (Calvet et al. 2003, Fig. 18.b-c). The chronological attribution of wide platters, as stated concerning B50, falls in the 18th-17th cent. B.C.: their occurrence in association with the painted goblets and jars with thin ribbon-rim in the levels below the Kassite artisanal area, i.e. before this was set in use, speaks in favour of a filling of the canal in the Old-Babylonian period.

IX – New Epigraphic Discoveries in Larsa

Dominique Charpin and Antoine Jacquet

Fig. 1 *– The "Archive Room" 1598 in House B49, from the northwest.*

The epigraphic discoveries made during this season all date from the early Old Babylonian period (or the so-called "Isin-Larsa period"). They will be presented here according to their place of discovery and in chronological order.

Building B49

The epigraphic discoveries from room 1598 were numerous and very interesting (Jacquet and Kwin Anid, this volume). It is clearly the remains of an originally important archive: broken tablets, numerous pieces of envelopes, but also fragments of sealings of chests and baskets were found scattered on the floor of the room (Fig. 1). The tablets were probably originally kept in a wooden chest and a reed basket whose charred remains were found on the floor and in at least five bowls, whose broken fragments were found between the chest and the threshold (Fig. 2). Given their very fragmentary condition, these tablets were obviously deliberately thrown on the floor and broken before the room in which they were kept was set on fire. The fact that the floor of the room was partly tiled made the ransacking all the more brutal. The proximity of the modern floor surface made the conservation problem worse, as the tablets and fragments found were severely salinized.

***Fig. 2** – Fragments of cuneiform tablets on the floor of room 1598.*

The main individuals in these records are Etellum and his two sons Ikun-pi-Ištar and Sin-ṣululi, who were clearly the owners and occupants of the house. The former was appointed grand vizier (SUKKAL.MAH) by king Gungunum (1932-1906 B.C.) and remained in that position until the end of the reign of his son and successor, Abi-sare (1905-1895 B.C.). There were until now very few attestations of the title of SUKKAL.MAH for the Old Babylonian period[1]: the known "prime ministers", later in the Old Babylonian period, simply bore the title SUKKAL[2]. Obviously, the kingdom of Larsa in the twentieth century stood in the continuity of the kingdom of Ur III, where the title of SUKKAL.MAH is well documented[3]. The seal of Etellum was found on many tablets and on the sealing of a chest[4]. The legend reads: (i.1) gu-un-gu-nu-um (2) ra-bi-an / MAR.TU (3) DUMU sa-mi-um (ii.1) e-te-el-lum (2) SUKKAL.MAH (3) DUMU nu-úr-é-a (4) IN.NA.BA "(i) Gungunum, Amorite ruler, son of Samium, (ii) to Etellum, grand vizier, son of Nur-Ea, gave (this seal)" (Fig. 3). It is a seal of the type "in-na-ba", of the same type that the kings of Ur III offered to their highest dignitaries, with a legend engraved on two columns[5]. It should be noted that Gungunum is qualified on this seal as *rabiân Amurrim*, a title which was born previously by his father Samium and his brother Zabaya, but which was not yet known for him[6]. The inscription

[1] Leaving aside the use of this title by Elamite emperors (Peyronel 2018, 217), the kingdom of Ešnunna offers two exceptional mentions: in an archaic Old Babylonian letter (AS 22 28: 6) and in the letter A 7537 (cited in CAD S, 360b; see also Charpin ip 1).

[2] Charpin 2004, 258-259; see also Charpin 2018, 133 for Isin and Babylon. Note that in UET 5 544: 10, the name of Etellum is followed by the indication ⌜SUKKAL⌝ *gu-un-gu-nu-um*; this was clearly an abbreviation for the full title SUKKAL.MAH; note that this tablet dates to the Rim-Sin period (Charpin 2017). Similarly, the emperors of Elam described themselves as SUKKAL.MAH, but are often cited by others only as SUKKAL.

[3] Sallaberger 1999, 188-190.

[4] The seal legend is reconstructed from different impressions on fragments grouped under the numbers L-Tab-1080-9 and L-Tab-1084-2.

[5] See Gelb 1977.

[6] For this title, see the discussion in Charpin 2007, 170 (with the earlier bibliography).

commemorating the construction of the wall of Larsa, gives him the titles of "king of Larsa, king of Sumer and Akkad" and omits the traditional title of *rabiân Amurrim*[1]. However, this inscription dates from the end of the reign[2], and one can therefore think that Etellum was appointed "grand vizier" in the first part of the reign of Gungunum, at a time when the title of *rabiân Amurrim* was still used. As indicated above, Etellum seems to have remained in office until the end of the reign of Abi-sare (1905-1895), the son and successor of Gungunum. A tablet dated to the year 11 of Abi-sare mentions a large quantity of grain spent for Etellum's food rations[3].

Fig. 3 *– Impression of the seal of Etellum, Grand Vizier of king Gungunum.*

Several tablets have the seal of a son of Etellum called Ikun-pi-Ištar[4]: *i-ku-un-pi*$_4$*-iš*$_8$*-tár* / DUMU *e-te-el-lum* / SUKKAL.MAH "Ikun-pi-Ištar, son of Etellum the grand vizier" (Fig. 4), while the texts mention his name in the abbreviated form Ikun-piša. Others are sealed by another son of Etellum named Sin-ṣululi[5]: ^{d}EN.ZU.AN.[DÙL] / DUMU *e-te-el-lum* / SUKKAL.MAH / IR$_{11}$ *a-bi-sa-re-*[*e*] "Sin-ṣululi, son of Etellum the grand vizier, servant of Abi-sare". It should be noted that neither the seal of Ikun-pi-Ištar nor that of his brother indicate their title: only the prestigious one of SUKKAL.MAH appears after the name of their father. The seals of Etellum, Ikun-pi-Ištar and Sin-ṣululi complete the already known seal of Etellum's wife, Ayalatum[6]: *a-a-la-tum* / DUMU.MUNUS *a-bi-sa-da-a* / DAM *e-te-lum* / SUKKAL.MAH / *gu-un-gu-nu-um* "Ayalatum, daughter of Abi-sada / wife of Etellum the grand vizier of Gungunum". This is a very rare case for an elite family of this period, where the personal seals of the father, mother, and two sons are known.

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[1] Frayne 1990, 117 no. 3.

[2] See the name of his 21st year: mu bàd gal ud-unu^{ki}-ma ba-dù "Year: The Great Wall of Larsa was built" (https://www.archibab.fr/N792).

[3] L-Tab-1084-4.

[4] See e.g. L-Tab-1080-8, L-Tab-1080-12, L-Tab-1080-17, L-Tab-1080-18, L-Tab-1084-4.

[5] See e.g. L-Tab-1081-2.

[6] See Mayr 2010, to be corrected with Földi 2016 and Charpin 2017; https://www.archibab.fr/S880.

***Fig. 4** – Impression of the seal of Ikun-pi-Ištar, son of Etellum.*

The content of the texts reflects the management of the residence and not the responsibilities of the grand vizier. Most of the texts are accounting documents: these receipts correspond to the internal management of the household (rations to the teams of workers, food for the livestock, etc.). Expenditures are most often ordered by Ikun-piša; the majority of receipts are sealed by Išme-Sin[1] and Ili-puzri[2], who must have been two intendants. The correspondence is limited to three fragmentary letters, two of which are addressed to Ikun-piša, one being sent by Etellum himself. There is also a letter envelope addressed by Išme-[...] to Išme-Sin. Finally, we found some contracts. With these discoveries, a whole new part of the history of Larsa in the late twentieth and early nineteenth centuries is revealed. The corpus of seal impressions, numerous both on the tablets and on the fragments of envelopes, makes it possible to reconstruct more than twenty-five different seals, some of which have a magnificent iconography: they belonged to scribes[3], a priest, a merchant, etc., all members of the Larsa elite at that time. But above all, some legends revealed new dignitaries and members of the royal family: two impressions of the seal of a princess named Rubatum were found[4]: *ru-ba-tum* / DUMU.MUNUS *za-ba-a-a* / DAM *iš$_8$-tár-ki-ma-ì-lí-a* "Rubatum, daughter of Zabaya, wife of Ištar-kima-iliya". She was the cousin of king Abi-sare; her husband was unknown until now. It should be noted that no seal of a royal princess of Larsa was known until now.

Samium (1976-1942)

Zabaya (1941-1933) Gungunum (1932-1906)

^{f}Rubatum Abi-sare (1905-1895)

Seal impressions of Ea-šar, son of Nur-Ea, and thus brother of the grand vizier Etellum, were also found[5]: *é-a-š*[*ar*] / DUMU *nu-úr-é-a* / Ú.TÚL *sa-mi-um* "Ea-šar, son of Nur-Ea, *utullum* of Samium". It should be noted that he is described on his seal not as "servant" of Samium, but as his

[1] The legend of his seal reads: *iš-me-*^{d}EN.ZU / DUMU *a-ku-ṣum* (L-Tab-1080-13).

[2] The legend of his seal reads: *ì-lí-p*[*u-u*]*z*-[*ri*] / DUMU AB RI NI A (L-Tab-1080-16); the second line must still be understood.

[3] The four scribes are:
– Enki-hegal : ^{d}E[N.K]I.HÉ.GÁ[L] / DUB.SAR / DUMU *é-a-ma-lik* (L-TAB-1084-5) ;
– Ilam-nu'id : DINGR-*lam-nu-id* / DUB.SAR / ÌR (d)NIN.x (L-TAB-1081-16) ;
– Ipiq-Ea : *i-pí-iq-é-a* / DUB.SAR / DUMU *e-ri-bu-ni-šu* (L-TAB-1081-18) ;
– Šu-Nabium : *šu-*^{d}*n*[*a-bi-um*] / DUB.[SAR] / DUMU ^{d}… (L-TAB-1081-7).

[4] L-Tab-1084-14 et L-Tab-1084-15.

[5] L-Tab-1084-8 et L-Tab-1084-11.

Ú.TÚL. Until now, only one *utullum* of king Abi-sare was known[1]. This title of *utullum* is usually translated as "manager of the flocks", but what is striking here is to see the title followed by the name of the king: Ea-šar was clearly the chief (or one of the chiefs) of the pastures of the kingdom of Samium and the Akkadian title of *utullum* is certainly the equivalent of the Amorite title of *merhûm* in the kingdom of Mari[2]. We have here an additional element that demonstrates the dimorphic character of the society of the kingdom of Larsa at this time, as has been well shown by P. Steinkeller (2004). Ea-šar thus had authority over the part of the population that remained nomadic, while his brother, who occupied the function of "grand vizier", was responsible for the sedentary part of the kingdom's population.

Nur-Ea

Ea-šar, *utullum* of Samium — Etellum, *sukkalmahum* of Gungunum and Abi-sare

Ikun-pi-Ištar Sin-ṣululi

The historical depth of this archive is only about twenty years, from 1915 to 1895: three tablets date from the second half of Gungunum's reign (1932-1906), namely years 17, 25 and 27. All other tablets with a year name are dated to his successor Abi-sare (1905-1895), from year 1 to his 11th and last year. None of them date from Sumu-El. The texts do not say when the house was built, but it can be hypothesized that residence B49 dates from the time when Gungunum transformed Larsa. The construction of the city wall, commemorated in the inscription and in the name of its 21st year[3], was certainly only one element of a vast urban planning operation that took place in the middle of the reign and lasted several years, of which buildings B48 and B49 are certainly two major witnesses. The epigraphic discoveries, on the other hand, make it possible to date precisely the moment when the residence B49 was abandoned and destroyed, coinciding with the end of the reign of Abi-sare, since the most recent text is dated to the 11th and last year of Abi-sare. The continuity between the reign of Abi-sare and that of Sumu-El has generally been put forward[4]. But it should be noted that nowhere does Sumu-El claim to be the son of Abi-sare as one would expect according to the rules of succession. Moreover, the violence with which room 1598 was ransacked and the entire house of the grand vizier burned down makes one wonder whether Sumu-El did not take the throne by force: the fact that Abi-sare's reign lasted only 11 years could be explained in this way.

[1] YOS 14, seal impression 86*: [NP] / Ú.TÚL *a-bi-sa-re-e* / DUMU *ku-ú-ku-nu-um* (www.archibab.fr/S11644). It is found on YOS 14 190 (www.archibab.fr/T25804) and YOS 14 197 (www.archibab.fr/T25811), two texts dated to the year 5 of Abi-sare.

[2] Durand 1998, 471-472 ; Streck 2000, 105-106 ; Durand 2004, 50.

[3] See above n. 7 and 8.

[4] Fitzgerald 2002, 55-56 : "In spite of the lack of evidence for dynastic continuity between Abī-sarē and Sūmû-El, there is clear administrative continuity between the two kings. For example, a group of archival documents studied by Walters (Walters 1970), concerning building and irrigation work associated with a person named Lu-igisa (or Lugisa), contains texts dated from the seventh year of Abī-sare to the eighteenth or nineteenth year of Sūmû-El. In addition, many administrative texts dated with Sūmû-El year names bear Abī-sarē servant seal impressions (YOS 14 219, 220, 230, 232-234, etc.)." It must be said that these arguments are not decisive: certain elements of continuity in the administration do not imply dynastic continuity. At Mari in 1775 B.C., the arrival of Zimri-Lim marked a dynastic break with the return of the old royal family (Charpin & Ziegler 2003). However, there are elements of continuity in the administration, primarily with the diviner Asqudum (cf. Charpin 2011), but also with simple artisans (Charpin 1987; Guichard 2019: 2 n. 1).

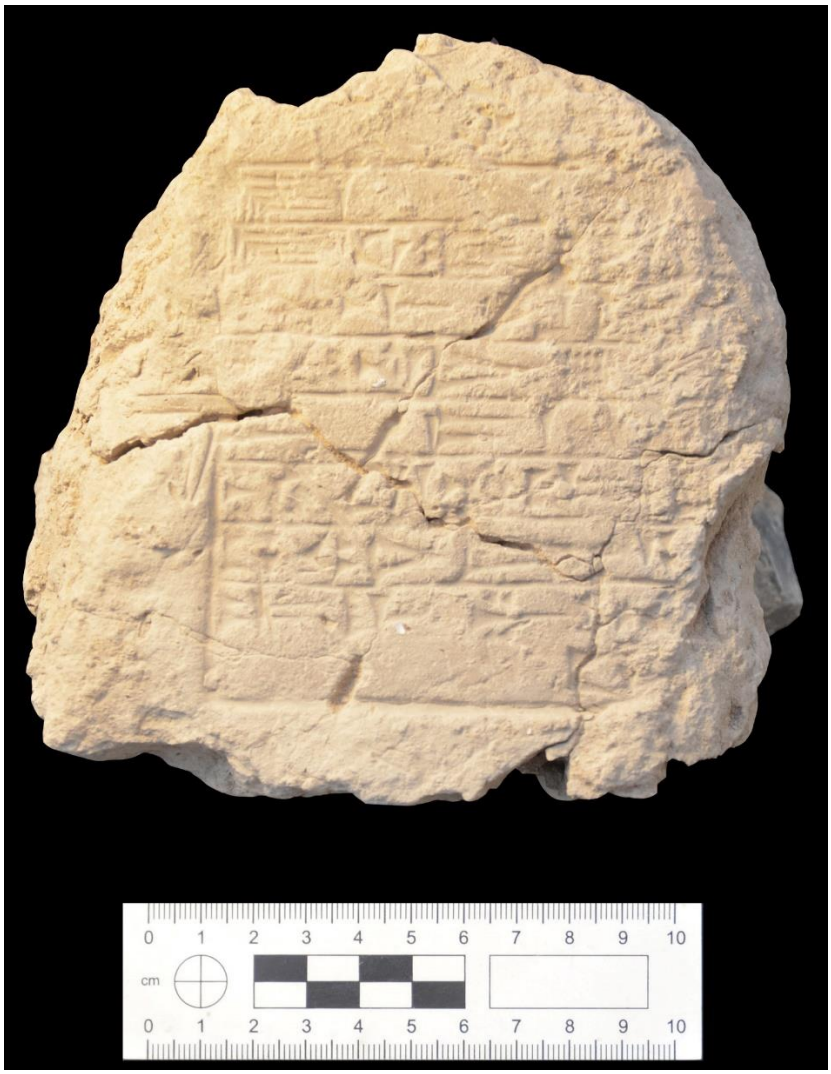

***Fig. 5** – Fragment of mud brick with an inscription of king Sin-iddinam, discovered in building B50.*

Building B50

In the filling of room 3019, 8 fragmentary mud bricks with the inscription no. 3 of Sin-iddinam and 2 with the inscription no. 4 were found[1] (Ait-Said, Vobauré and Vallet, this volume). Both texts commemorate the works of the Larsa king Sin-iddinam (1849-1843) in the Ebabbar, the temple of Šamaš in Larsa (Fig. 5). But the location of the latter building is well known and B50 is located only 35 meters north of the Ebabbar, the two buildings being neighbors, as shown on the new site plan (Vallet, this volume). How to explain that such bricks were originally inserted in the wall of the B50 building itself? What was the link between the building and the temple of Šamaš? The most likely hypothesis at the present time is that B50 was the Gipar, the residence of the *entum*-priestess devoted to the god Šamaš[2]. The very size of the building supports this hypothesis, which has yet to be confirmed. Very close to the temple, B50 was in any case part of the religious complex.

[1] See the edition in Frayne 1990, 160-161 (no. 3) and 161-162 (no. 4). None of the examplars known so far have been found in situ: they are bricks collected on the surface, in the area between the ziggurat and the palace of Nur-Adad (details are given by Frayne 1990).

[2] For the *entum*-priestesses of Šamaš, see Renger 1967, 122-123 (a section of only nine lines). The documentation is now much more abundant and has been collected and commented in Charpin ip 2.

Site PZ

An inscribed baked brick was discovered in construction 4511 (Fig. 6). It bears the inscription no. 3 of Sin-iddinam (1849-1843), which commemorates the works undertaken in the Ebabbar. The inscription helps to date the construction, not to determine its nature (see Zingarello, Bachelot and Hsony, this volume). We can think that it was integrated into this structure near the ziggurat, because the whole area belonged to the temple of Šamaš in the broadest sense.

***Fig. 6** – Backed brick with an inscription of king Sin-iddinam, in situ in construction 4511 of Trench PZ.*

But the very fact that this structure, clearly linked to the great canal of Larsa, can be dated to the reign of Sin-iddinam is in itself significant. The supply of water to the city was a problem that concerned the kings of Larsa for a long time. King Abi-sare in the name of his 6th year commemorated the digging of the *hirîtum* of Larsa (1900 B.C.): this type of water-filled ditch is translated as "moat". Because of the medieval castles, they are necessarily imagined to be located outside and, in fact, Neo-Babylonian texts indicate that the *hirîtum* of certain cities was located

outside the rampart[1]. But there are two variants for Abi-sare 6: one says "the *hirîtum* of the wall of Larsa"[2] and the other "inside Larsa"[3]. It is therefore not impossible that this *hirîtum* was a canal located in the city, inside the wall (see Vallet, Cez and Darras, this volume, on this point and for a presentation of the hydraulic network as a whole). With time, water from the Euphrates was no longer sufficient to supply Larsa, despite the efforts of Nur-Adad (1865-1850)[4]. Thus, his son Sin-iddinam envisaged a radically new hydraulic project: to divert water from the western bed of the Tigris[5]. He commemorated this in the name of his second year[6] and in a long inscription known by ten "barrels"[7]. He formulated his goal in this way: "to establish fresh water for my city and (my) country"[8] and concluded the description of his work: "I have provided perpetual water and unceasing abundance to Larsa and my country"[9]. The 4511 construction found in trench PZ surely was part of this overall policy of water works.

[1] See CAD H, 198b (Nebuchadnezzar inscription VAB 4 74 ii 24).

[2] Sigrist 1990, 13 : mu ^{i7}*hi-ri-tum* bàd larsa^{ki} ba-ba-al (YOS 14 192, 194, 195, 199 à 204).

[3] Sigrist 1990, 13 : mu ^{i7}*hi-ri-tum* ša larsa^{ki} ba-ba-al (Thureau-Dangin 1918, 5 : 39).

[4] See the name of the year Nur-Adad E: mu ^{i7}buranun-na sahar dib-ba gibil-bi-šè hu-mu-un-ba-al "Year: (Nur-Adad) re-dug the Euphrates, which was filled with earth" (https://www.archibab.fr/N847). This formula is not yet attested as a year name, but has been deduced from the text published by van Dijk 1965, 209-211.

[5] See Steinkeller 2001, 31, but without the reference to the city of Larsa itself.

[6] The formula is mu ^{i7}idigna ba-ba-al "Year: the Tigris was dug" (https://www.archibab.fr/N857).

[7] Frayne 1990, 158-160, no. 2. The exemplar found at Larsa (AO 25109) is not a cone, as D. Arnaud claims, but a fragmentary barrel (see photo on the Louvre website https://collections.louvre.fr/ark:/53355/cl010149786). Since 1990, new duplicates have been published, which allow a better understanding of the inscription: Beckman 1997 (ex. 5 to 8), Civil 2002 (ex. 9) and Westenholz & Westenholz 2006, 93-100 no. 4 (ex. 10). It is interesting that Frayne's ex. 4 (A 7467) was sold by E. S. David as "from Tell al-Buzekh", i.e. Ibzaikh, Zabalam in antiquity: this could have been the place of the Tigris River intake of the canal dug by Sin-iddinam. This tell has been severely looted since 1991 (https://www.aiamilitarypanel.org/profiles/cptraining/iraq05-036.html): it could be the provenance of ex. 5-10.

[8] Frayne 1990, 159: (17) uru^{ki} ma-da-mu-šè (18) a-du$_{10}$ gá-gá-dè. In view of the parallel with l. 47 (see next note), uru^{ki} here must be a designation of Larsa. Steinkeller (2001, 31) translates "In order to provide sweet water for the cities of my country", but there is no plural in the Sumerian text.

[9] Frayne 1990, 160: (47) a-da-rí (48) hé-gál mùš nu-túm-mu (49) larsa^{ki} kalam-ma-mu-šè (50) hé-em-mi-gar. Frayne's translation "providing perpetual water, unceasing abundance for Larsa, my land" needs to be modified, in view of l. 17 where we have uru^{ki} instead of larsa^{ki} and ma-da instead of kalam: in both cases, there is a pair composed of the capital and the (rest of the) kingdom.

X – Building B33: An Updated Assessment of the State of Preservation

Melania Zingarello

***Fig. 19** – Plan of B33 Area as excavated at the end of the 1980s superimposed on the orthorectified image taken by camera drone in November 2021.*

The building called B33 was first identified during a survey of the north-east sector of Larsa carried out in 1985[1] and then excavated by J.-P. Thalmann during two seasons in 1987 and 1989[2]. It is a large architectural complex, of which only the north-west side has been exposed for a length of about 62 m, its minimum width being 35 m. The total surface covered by the complex thus exceeds 2000 m^2. In several places, the building was disturbed and obliterated by structures dated from the Isin-Larsa period (ca. 2000-1750 BC). The steep slope from west to east and from south to north, as observed in the excavated area, is due to the erosion of these later structures, whose remains were preserved especially above the west and south-west sectors of the building. In the 1980s, three main phases of the complex were recognised, labelled I to III from the earliest to the latest one. Phases I and II, corresponding to the main occupation of the building, have been dated to the Early Dynastic

[1] Huot et al. 1989: 26-28, fig. 9a and 13.

[2] Thalmann 2003.

IIIa period, with its foundation possibly going back to the Early Dynastic II[1]. The last phase is represented by the reoccupation of the complex by modest constructions of domestic nature dating to the end of the Early Dynastic period (ED IIIb) and the early Akkadian period, according to the traditional Mesopotamian terminology.

During the last excavation season at Larsa, a short visit to the area B33 was carried out to assess the state of preservation of the building. In particular, it was aimed at detecting any shift of the sand dunes, whose morphology does constantly change, to evaluate a possible return to the field in the area soon. It has been ascertained that the dunes covering the northern and eastern sectors of the building B33 have partly moved towards the west, where they currently hide the west wing of the architectural complex. Conversely, the south part of the building is fully accessible. The series of small rooms excavated at the end of the 1980s (nos. 12-16 in Fig. 1) is easily recognisable, with the typical red masonry emerging from the surface (Fig. 2). Room 8 is equally clearly visible, as it is the southern part of "Court" 4 to the north and the rectangular Room 21 to the west.

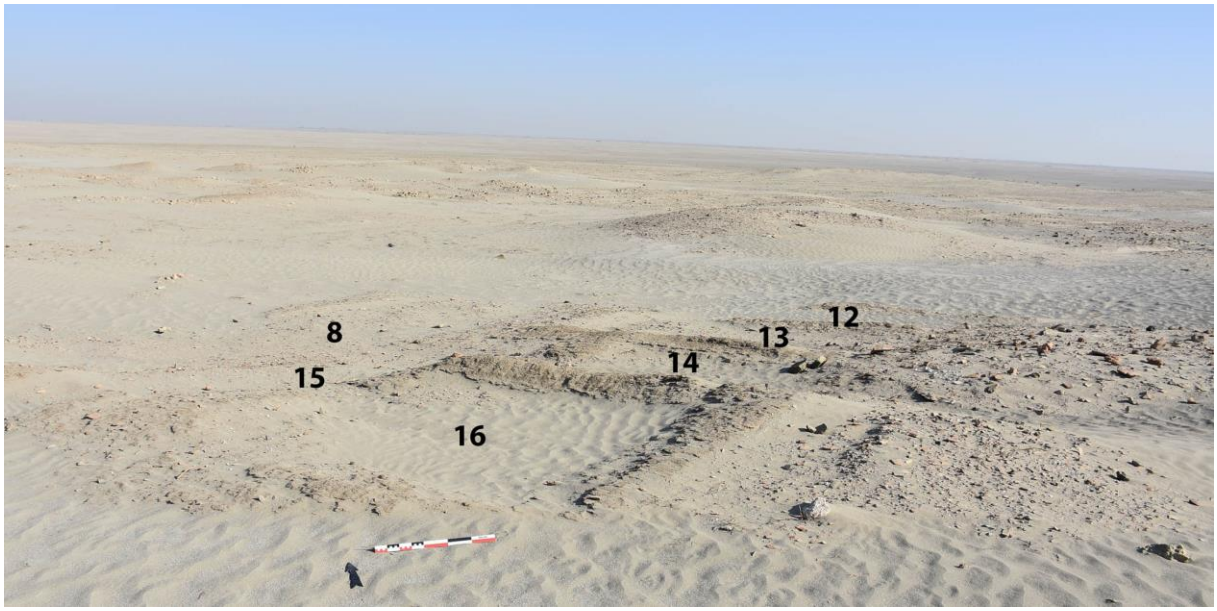

***Fig. 2** – View of the southern remains of the building B33 as excavated in the 1980s from the south-west. The numbers indicate the excavated rooms visible today from the surface (photo M. Zingarello).*

It is possible to outline from the surface a new series of rooms south of Rooms 12 and 13 and especially to the west of Room 21 (Fig. 1). Here, complete or almost complete small vessels, mostly beakers and conical bowls, lie on the ground. Because of their position, it can be assumed that they belong to the last phase of building, i.e. to the domestic reoccupation of the architectural complex.

It is worth mentioning the discovery on the surface, close to the south-west corner of Room 8, of a small fragment of a limestone plaque[2], pretty damaged by the erosion, depicting a bearer of offerings (probably a bundle of reed[3], Fig. 3), certainly dated from the Early Dynastic III period. The nature of this kind of object might suggest that it comes from the main occupation phases of the building (Phases I-II).

[1] The chronological and terminological issues concerning the periodisation of Southern Mesopotamia are not addressed here. Thus, in this report, the terminology employed by the excavator (Thalmann 2003) is used.

[2] Actually, the fragment might be part of an inlays panel or frieze, even if the thickness of the object (about 3 cm) argues for the hypothesis of a plaque.

[3] Cf. Dolce 1978, pl. X, nº K52.

Fig. 3 *– Fragment of a limestone plaque depicting a bearer of offerings, probably a bundle of reed (photo M. Zingarello).*

In light of the evidence provided by the material culture (pottery and objects) and because of the accessibility of the structures appearing to the surface, a resumption of the excavations in the area B33 cannot be anything but highly promising in order to explore the mid-Third Millennium BC levels at Larsa.

XI – Tell el ʻUwaili 2021: Architecture and Stratigraphy

Johnny Samuele Baldi, Emmanuel Baudoin and Mohaned Mohamed Mnather

Excavations at ʻUwaili during the Fall 2021 campaign took place from 2 to 25 November by J.S. Baldi, E. Baudouin, M.M. Mnather (archaeologists), C. Douché (archaeologist and palaeobotanist) and twelve (for the first week) or ten workers. Fieldwork operations were concentrated in the same area already been excavated during the 2019 spring and fall campaigns, connecting the squares then explored and further expanding the excavation surface both northwards and southwards (Fig. 1).

***Fig. 1** – Plan of structures of Levels 5b, 5a and 4 (Ubaid 0 and 1 phases).*

This made it possible to observe that, in that sector of the site, the most ancient vestiges, dating from the Ubaid 0 and Ubaid 1 phases, are preserved up to more than half of the slope of the archaeological tell. This has allowed activities to focus on these oldest and very poorly documented phases in Mesopotamia rather than on a longer sequence. The large-scale excavation of these two phases has resulted in the production of an extremely relevant archaeological record, as local Ubaid 0 (known exclusively in 'Uwaili) and Ubaid 1 levels are the largest ever excavated in the whole Mesopotamian region.

Level 5: Ubaid 0 phase

The study of the oldest structures was oriented towards two goals: on the one hand, to continue the extensive excavation in order to allow a better understanding of the spatial organisation of the Ubaid 0 village and, on the other hand, to specify the internal phasing at this level. This allowed a stratigraphic subdivision into sub-levels 5b (oldest phase) and 5a (most recent one)[1]. The now surface currently known of this phase is occupied to the north by the elegant, pillared rooms of Building B37 and the associated granary on its eastern side. Further south, an area of about 150 square metres is occupied by two barns (G1 and G2), built as separate but closely associated structures, to the extent that the narrow passage separating them is sealed off to the west, where the corners of the two buildings touch each other. These two buildings, already brought to light in 2019, differ little in size and show homogeneous architectural features, with small quadrangular spaces bordered by walls and used as basements, mudbrick working platforms and food ovens. Compared to the 2019 excavations, it was possible to observe that, since the early stage of Level 5, the plan of the architectural complexes south of the G1 and G2 granaries was much more elaborate and developed than previously thought.

***Fig. 2** – View from the north of Building B110 (Level 5b-5a).*

[1] Which correspond to levels IB and IA of 1989.

Fig. 3 *– Access door to building B110 with food oven 74 (Level 5b-5a).*

Fig. 4 *– Central wing of B110: masonry pillars and posthole that supported the upper floor (Level 5b-5a).*

In particular, B110 (Fig. 2), a trapezoidal building measuring approximately 10x5m, was not a house, but rather a construction dedicated to the storage and processing of foodstuffs, occupying the surface between three streets, with the passage 2011 as northern limit and a thick wall as southern façade. This building had three east-west oriented wings of very uneven size: the north and central ones were occupied by ovens, workbenches, and mudbrick basins, while the large south wing was made up of cells probably intended for storage. The walls of the cells in this southern area probably supported a raised floor, perhaps accessible from the working platform (2113, that was probably equipped with an access ladder) next to basin 2069, in the central wing. Given the presence of thick walls, pilasters, heavy pillars and posts holes in the central wing, it is likely that the whole building had an elevated floor (possibly accessible by a staircase along the north wall and above basins 2065, 2066 and 2067, to the right of the entrance door and food oven 74 – Fig. 3). The weight of the floor was evenly distributed both on the perimeter walls and on internal vertical supports (Fig. 4). On the basis of artefacts (plough points, grindings stones, millstones) and in-situ pottery (essentially jars, without forms intended for consumption), the upper floor was probably also dedicated to storage activities, while in the north and central wings of the ground floor foodstuffs were processed. The presence of several basins of different shapes and sizes along the load-bearing walls of the building (2065, 2066, 2067, 2068, 2069, 2095, 2096) seems to be a further clue in this respect.

***Fig. 5** – Aerial view of the storage cells in building B111 and those in the south wing of building B110 (Level 5b), with later annexes G3 and G4 (Level 5a).*

As early as Phase 5b, east of alley 93, the cells of Granary B111 extended along the east-west axis bounded by alleys 94 (to the north) and 95 (to the south). Later, in Phase 5a, adjacent to the southern façade of the B110 complex, a barn (G3) was built with differently shaped cells that extended even further west than the boundary of B110 (thus revealing that the alley 2110, at the

western edge of the excavation area, turned further west). At the same time, another storage complex (B109/G4) was constructed adjacent to the southern portion of the east façade of B110, following the axis of Route 95 (Fig. 5). Structure G3 was only partially excavated and extends further south than the southern limit of the trench. But the significant morphological and dimensional difference of its cells compared to the cells and basins of B110 clearly shows how G3 constitutes a later addition. This was also demonstrated through a detailed study of the bricklaying system. Indeed, despite the uneven size of B110's wings, the masonries of all its main walls, both outer and inner load-bearing, were interlocked. In contrast, the walls of G3 and G4 were only leaning against those of B110, and were therefore built later. For this reason, and precisely because the south barn and B109 were structures built later than B110, standing against the perimeter walls of B110 but with no supporting walls embedded with those of B110, the erection of B109 involved the construction of wall 2006 as an extension of the wall separating the central and southern wings of B110. Nevertheless, wall 2006 simply leans against the corner of the previous B110 wall to take up its orientation, without being bound to it. At a slightly later stage, B109 was enlarged with the addition of some additional cells (2001, 2002 and annexes). This resulted in the narrowing of Alley 95, which nevertheless retained its east-west alignment.

***Fig. 6** – Aerial view (perspective towards the south) of road 2112 and the parallel thin-walled substructures of building B113 (Level 5a).*

During phase 5b, by contrast, Alley 94 was partially cut by the addition of a north-south oriented extension north of Barn B111 and east of G2. This annexe (B112), composed of unevenly shaped cells and a large food oven (2017), extended northwards as far as the south wall of the G1 granary ovens platform. From there, another addition (B113) extended further northwards (up to road

2112), with long walls of a single brick width, parallel and evenly spaced to each other (Fig. 6). These long parallel walls certainly belonged to the recent state of Level 5 (5a) since, although very poorly preserved due to weathering, they continued above the work platform of Granary G1, where their outline could still be identified. These walls most probably constituted the base of a raised floor level acting as a "crawl space" according to a substructure system similar to that known in Tell es-Sawwan Levels I-II or at Yarim Tepe I level 5 (Breniquet 1991; Merpert and Munchaev 1973: pl. XXXVII)). Indeed, in the long rectangular spaces between them there were hardly any sherds, while all the other quadrangular and shorter cells of all the granaries yielded jars and shapes intended for storage. The two consecutive annexes to B111 probably had different functions, but respected the same architectural logic, with the addition of extensions and blocks of relatively homogeneous sizes (such as B112 and B113), and with at least one of the parallel walls continuing the line of a previous one. The wall marking the eastern boundary of the whole of these annexes (B112 and B113) had several recesses and thickenings made of header and breezeblock mudbricks (Fig. 7-8): these arrangements suggest that the easternmost sector was probably a courtyard or an open space. Even further north of B112, north of Alley 2112, mudbrick bins and cells belonging to a sub-level of Building B41 (phase 5a), excavated in the 1980s, were also identified.

***Fig.** 7 – Detail of the thickening of the wall marking the eastern limit of buildings B112 and B113, made of header and breezeblock mudbricks (Level 5a).*

The architectural logic is not only consistent within each Ubaid 0 level, but also in the transformations between Sub-levels 5b and 5a. The continuity of the structures is evident, demonstrated above all by the overlapping walls of the two levels, which in fact often constitute mere reconstructions. This trend is so pronounced that the plan presented here (Fig. 1) shows, towards the northern limit of the sounding, a perfect overlapping of the structures of the two phases excavated during the 1980s in the area of buildings B37 and B41. The same criterion – namely some internal changes to edifices that nevertheless retained the same perimeter, shapes and dimensions – can be observed between structures G1 and B113. In fact, these two structures basically represent two phases of the same building, reconstructed in phase 5a, but with the east-

west oriented north and south walls of B113 which end up perfectly overlapping the north and south limits of G1. The result of this strong conservative coherence is that, even in cases where rather substantial changes occur between sub-levels 5b and 5a, implying additions that make the plan of the architectural blocks vary (as in the southern sector of the trench, around B110), the layout of the streets remains substantially unchanged. Even Alleys 94 and 95, which were narrowed in phase 5a, did not disappear or radically change their layout. This continuity of the alleys might suggest that not much time has passed between phases 5b and 5a. Also that the social basis of the organisation and occupation of space within the village tended to remain essentially stable.

***Fig. 8** – General view of the wall marking the eastern limit of buildings B112 and B113, from the north.*

The portion of the Ubaid 0 village that emerges is now beginning to be quite large (especially considering that in Phase 5a all the barns and buildings B41, G1, G2, B110, G3, G4, B111, B112, and 113 were in use at the same time). The structure of the settlement is dense and agglutinated, with architectural complexes integrating granaries and buildings for food processing separated by narrow streets. The latter constitute a structuring and lasting organisational feature which, given the homogeneity of all the complexes from a functional point of view (with supporting substructures, storage cells, basins and food processing tanks, and food ovens), suggests the existence of a subdivision of the settlement into blocks pertaining to different groups (Fig. 1).

Fig. 9 *– View from the east of Kilns 2002 and 2004, excavated in the Alley 93 and arranged on different levels despite belonging to the same phase (Level 4).*

Level 4: Ubaid 1 phase

The structures of Level 4 are much fewer in number and more limited in area than those of the previous phase. Compared to the 2019 excavations, it was possible to identify and excavate a few more pottery kilns, which confirm the architectural and technical characteristics already observed two years ago. All the kilns are round, with a diameter varying between 80 and 140 cm and walls formed by a single row of unbaked bricks protected by a layer of clay lining. All these firing installations belonged to the same technical typology as vertical draught double chamber kilns with a perforated floor separating the lower space with the fuel from the upper one with the pots during the firing cycles. All the lower chambers were buried to improve insulation, but, as already noted in 2019, all the kilns were built on different levels. Some were recessed into the alleys of the Ubaid 0 phase (2026, 2018, 2054, 2000, 2003, 2004 – Fig. 9), which were also used to dump ashes and firing waste. Other kilns, especially the larger ones (2031, 2032, 2030), were instead placed astride some of the cells of the Level 5 granaries in order to use the walls between the cells as support for the perforated floor of the kilns. Finally, another solution was to embed the lower combustion

chamber inside a cell of the previous level by building a clay platform all around it (2034, 2041 and 3006). These features imply the possibility for the craftspeople of Level 4 to opportunistically (and effectively) exploit the remains of the structures of the previous level, which must have been still visible at the moment of the construction of the kilns (Fig. 10). This suggests that, despite the radical functional change of the area between the Ubaid 0 and Ubaid 1 phases, the time lapse between the two levels must not have been very long.

***Fig. 10** – View from the south of kilns 2032 and 2030, which reused the walls of the cells of a granary (G4) of the previous phase to support their perforated floors.*

Likewise, although it is probable that not all the kilns were working at the same time (i.e. that some of them were refurbishments of this craft area), their spatial arrangement seems to have followed a consistent logic in relation to the remains of the previous phase. In fact, the firing installations were never installed in all spaces available in previous buildings: for instance, despite the available space, the north and central wings of building B110 were not disturbed by any kilns, while the cells of the granaries were not all systematically used to install furnaces, but only in some cases, functionally exploiting intermediate walls. The result is that the kilns are not agglutinated, often leaving large spaces between them coinciding with the platforms of the granaries of the previous level, or sometimes concentrating in the former alleys but having, even in that case, remains of Ubaid 0 walls at the edges (and at the same level of preservation) of the firing chambers (Fig. 10). Consequently, it is very likely that Level 4 does not correspond to a mere cooking area with a concentration of kilns, but to a real workshop, with platforms and walls from the previous level reused as workbenches by the craftspeople for the manufacture of vessels to be fired in the kilns. On the other hand, the presence of potter's tools throughout the area and especially in the former alleys (shells used both as material to be ground to obtain inclusions for mixing the clays and as shaping tools, rounded stones for smoothing, reused and polished pottery sherds for shape-making) suggests that the firing was not the only stage of the *chaîne opératoire* carried out in this sector of

the site. However, this craft area was located in a vast open space, with production units that, in addition to the previous structures they reused, were not delimited by walls, but in some cases were rather covered by light roofs supported by posts, as shown by some holes in the streets (2029).

The degree of organization of this workshop is surprising especially for such an ancient phase and deserves further studies in the next campaigns. For the moment, although the organisation of this large craft area represents a subject of great interest, it is impossible to reconstitute it with certainty. In fact, a consequence of the short time span between Phase 5a and Level 4 (or at least of the generalized reuse of the earlier structures in the latter), is that Level 4 consists of firing structures and craft facilities whose relative chronology is difficult to establish. The massive reutilisation of earlier constructions has led to the absence of floors proper to Level 4, which makes it impossible for the time being to recognise which kilns were in function at the same time and which, on the other hand, constitute later reconstructions. At the same time, the combustion structures are by no means randomly arranged: they use the previous platforms as walking surfaces, some previous walls as workbenches and perhaps some of the perimeter walls of Level 5 buildings as dividers between the craft spaces. Therefore, in the next campaigns, the priority for Level 4 will be to verify whether, despite the radical transformation on the functional level, the workshop organisation tends to respect the structuring and boundaries of the previous buildings.

XII –Report on the ceramic materials from Tell el ʻUwaili 2021

Johnny Samuele Baldi

During the 2021 fieldwork season 5103 fragments, belonging to all parts of the vessels, were studied and counted. The sorting, consisting of a highly selective multi-stage process, began during the excavation itself, and continued during the photography, marking, description and sampling of some sherds. Each of the classification and selection phases was based on a criterion of representativeness of the various ceramic groups (from a chronological, technical, morphological and stylistic point of view), both quantitatively (i.e. in general statistical terms) and according to the different excavation contexts which yielded the sherds.

Most of the ceramics from ʻUwaili are altered, often impregnated with hydrated calcium sulphate (gypsum), associated with sodium chloride (commonly called sea salt) filling the cracks and encrusting the surfaces. In some very limestone-rich pastes, it can be observed that there has been a recrystallisation of calcium from the calcite silicates. In other words, calcium from the synthetic calcium silicates recrystallised into calcite within the clay mass of the sherds, or in the pores. Therefore, a "desalting" treatment was necessary for most of the collected pottery (leaving it in basins of warm water for about two days) in order to observe the surface treatment techniques and decorations hidden by the salt crust.

Ubaid 0 ceramics

Ceramics from Level 5 (2232 fragments collected during the last campaign) are characterised by a moderately fine paste, quite well-fired although irregularly. Vegetal inclusions are quite abundant and largely predominant. Concerning mineral non-plastic inclusions, heavy minerals (amphiboles, pyroxenes, sphene, etc.), as well as altered mica flakes, are in smaller proportions. In some samples,

the sometimes relatively abundant black opaque grains probably are concretions of paedogenetic origin. The presence of very scattered altered grains of microlithic volcanic rocks should also be noted. As well as elements of biological origin, of elongated, sinuous, black opaque form, which probably are phytolith remains whose internal organic matter, trapped between two sheets of organic silica, has not been calcined, but pyrolyzed in situ and is therefore preserved in the state of "pyrobitumens" in the ceramic paste.

The surface of the walls is often covered with a rather matt paint that is generally poorly preserved. Most of the blackish-brown motifs tend to flake off and disappear gradually, leaving only an unfortunately inconspicuous imprint on the surface of the pottery. Red paint seems to be somewhat more resistant, prepared and applied with greater care. However, the often much deteriorated condition of the painted decorations suggests that their frequency must have been far more conspicuous than can be ascertained at present and that, therefore, the proportion between painted and plain sherds is largely distorted. The paint used for the decoration also varies greatly, depending on the firing conditions. The colour varies from beige to green to red-reddish-rose (about 72% of the baulk) and firing accidents (fire stains, deformations) are very frequent. The morphological range is not very large and, for most of the shapes, totally different from the typology of the subsequent Ubaid 1 phase.

Morpho-functional types include fairly large bowls (with a diameter of around 30 cm) with V-shaped oblique walls and, sometimes, with slightly flared rim, that can be either plain or decorated with rather thin painted bands, located either outside, above or inside the rim (according to a pattern that is quite common both in Samarra specimens and in Ubaid ceramics of the following phases Pl. I.1-2 and du Mesnil 1948: pl. XXI.A). Bowls with less everted walls and large deep bowls (sometimes carinated on the lower part of the body) present a thinned rim, like in the Samarra Level IIIA at Tell es-Sawwan, or in the Early Susiana phase at Djaffarabad (Ippolitoni 1971: fig. R.14; Dollfus 1975: fig. 27.8). Bottles, i.e. small to medium sized jars that are taller than wide and have narrow openings, are a shape also attested in the Ubaid 1: they show a slightly flared and thinned rim and both horizontal and vertical painted bands on the exterior wall (Pl. I.4). Carinated jars with convex shoulders and everted neck profile represent a distinctly archaic form, rather widespread during the Ubaid 0 and completely absent from Ubaid 1 onwards (Pl. I.3, 5, 6 – Lebeau 1987: Pl.IV.5, 7). A specific type of short-necked jars appears as a sort of quite globular pot with a short, thin everted rim (Pl. II.*1-2 – Lebeau 1987: pl.V.1-3). Jars with sinuous walls and slightly flared rim are characterized by a quite globular profile and a short neck (Pl. II.1 – Ippolitoni 1971: fig. J.10; Hole 1977: fig. 52.d). Bases are sometimes flat, but recessed bases are also documented, sometimes with a very pronounced central recess similar to archaic bases attested ad Djaffarabad, Djowi, or in the Sefid phase in the Deh Luran (Pl. II.3 – Dollfus 1975: fig. 16.9; Dollfus 1983: fig. 11.13; Hole 1977: fig. 38.aa5).

Limiting the morpho-stylistic parallels to the southern sector of the Greater Mesopotamia, parallels with the Khuzistan (Djaffarabad, Choga Sefid and Tepe Tülâ'ï) exist on a morphological level, but often are not very conclusive, both because of the absence of incised pottery in 'Uwaili and for clear differences in painted decorations. A similar consideration can be made concerning (undeniable) parallels with the classical Samarra style. Despite clear links in shapes and design of several geometric and linear painted motifs (horizontal bands with festoons, small hanging triangles,

grouped vertical bands, more rarely lozenges), in ‘Uwaili, decorations are much less sophisticated, less dense, less geometrically rigorous. Some convincing parallels can be found in Eridu Level XIX (Safar *et al.* 1981), probably dating from the transition between the Ubaid 0 and Ubaid 1 phases.

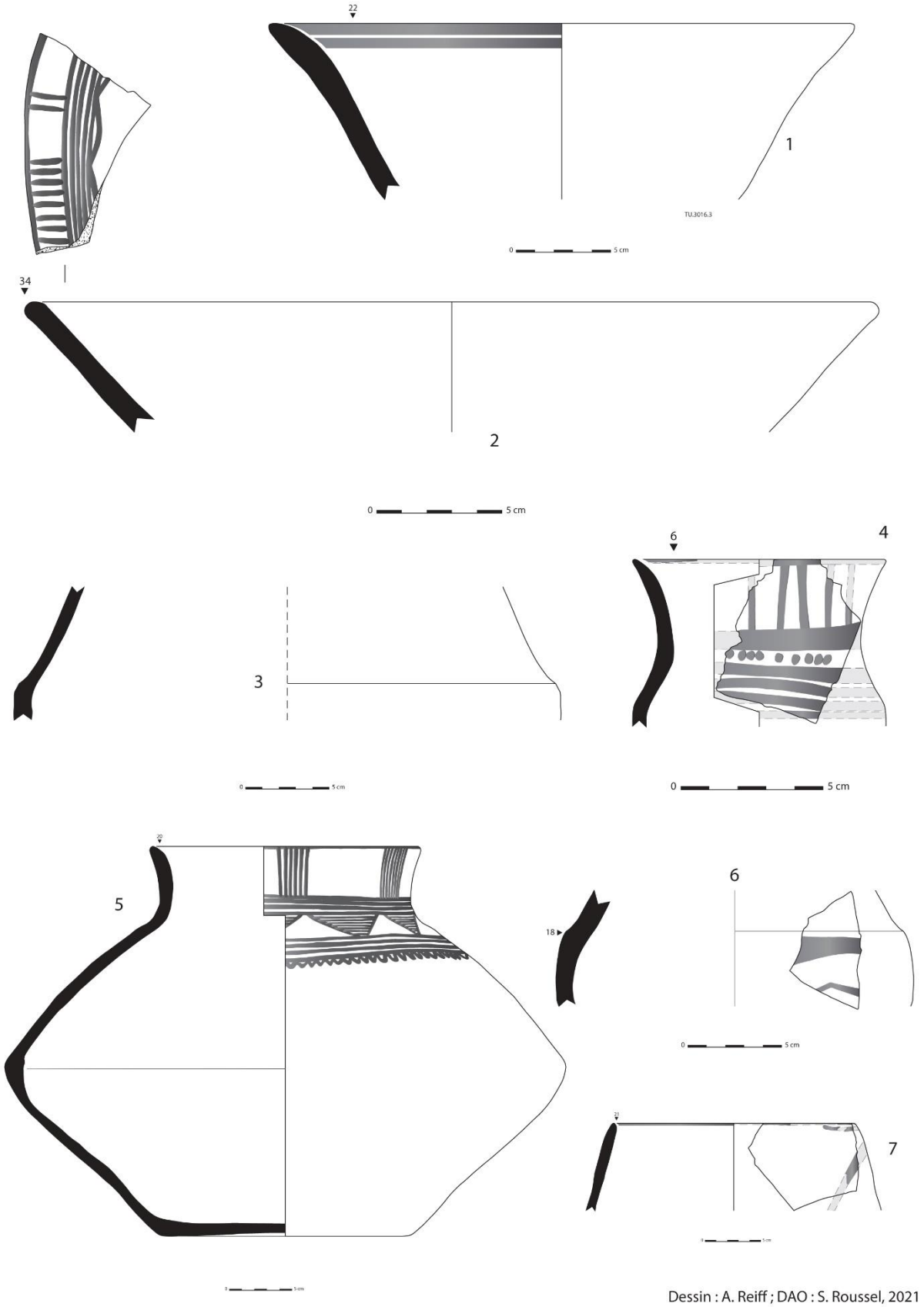

Plate I *– Selection of Ubaid 0 distinctive shapes from Levels 5b-5a.*

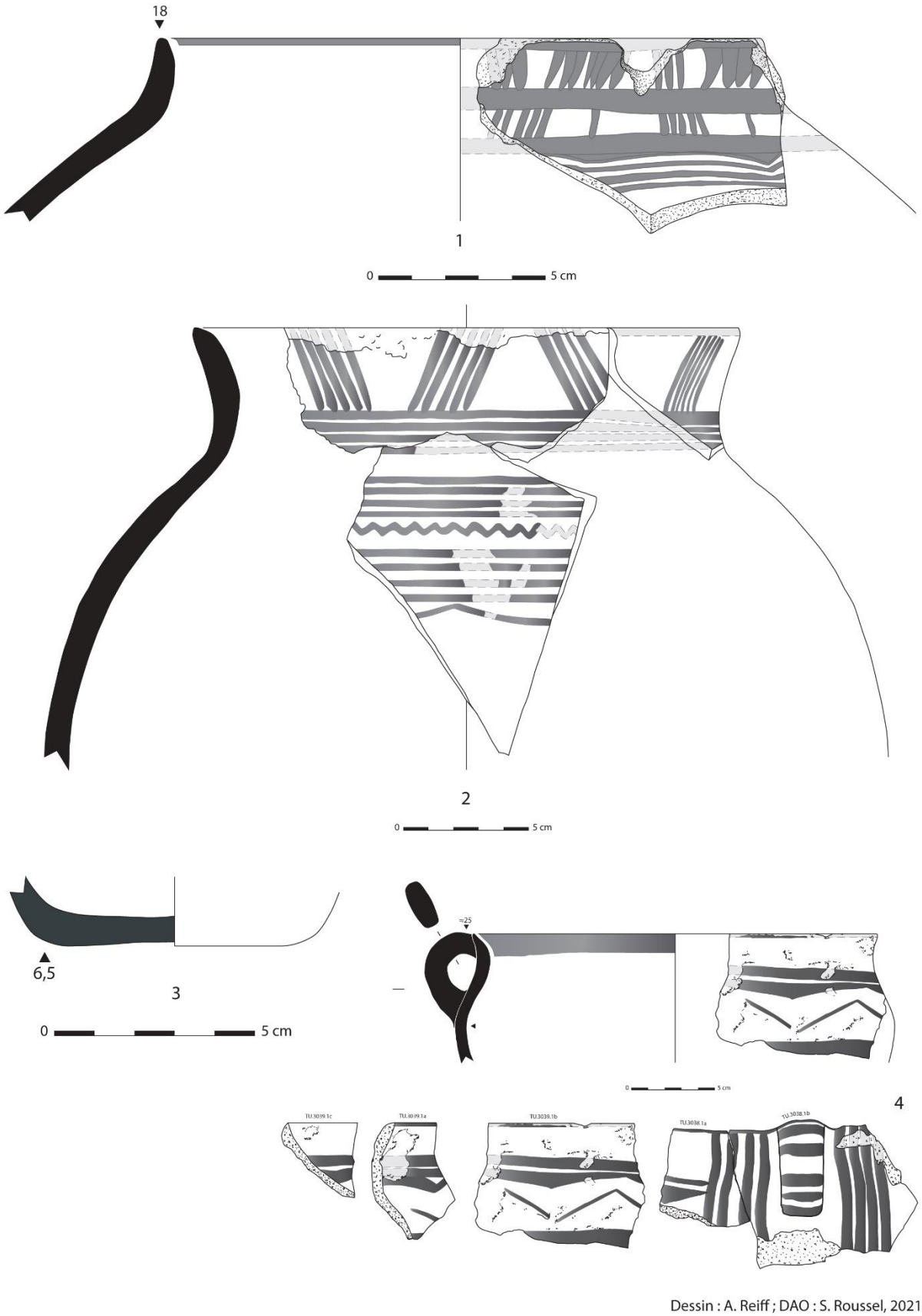

Plate II *– Selection of Ubaid 0 distinctive shapes from Levels 5b-5a.*

A significant morpho-stylistic evidence, that has never been sufficiently emphasised, is the typological discontinuity between the Ubaid 0 repertoire and that of the later Ubaid 1 phase. In this sense, some technical ruptures, such as the difference between Ubaid 0 and 1 assemblages, with a tendency towards the diffusion of fine mineral fabrics, had already been stressed during the previous excavations at 'Uwaili (Courtois and Velde 1984). But the typological discontinuity

deserves just as much attention and is equally impressive. Of the morphological types known during the Ubaid 0 phase, very few are still documented during Ubaid 1, i.e. the sinuous-bodied small bottles, the generic hemispherical bowls and the V-shaped shallow bowls (or plates) with an everted (and often decorated) rim. All other types of bowls and jars from the Ubaid 0 phase have distinctly archaic profiles, which have nothing to do with the later Ubaid tradition and completely disappear starting from Ubaid 1 (Fig. 1).

***Fig. 1** – Reconstructed rim of semi-globular jar with archaic profile: one of the several Ubaid 0 types that disappear at the end of the period.*

The same can be said in the field of painted decorations. The phenomenon concerning the latter is not simply the appearance of many more specific and complex motifs, which is a rather ordinary kind of discontinuity at the transition between different chronological phases, especially when the decorations become more complex, as in Ubaid 1. It is surprising, however, to observe that a particularly simple Ubaid 0 geometric motif such as the thin vertical bands descending from the rim in groups of 2 or 3 (Pl. II.4, Fig. 2), often used to arrange and articulate the visual rhythm of the decoration along the outline of the vessels, disappears forever after the Ubaid 0. One of the elements that will need to be investigated in more detail in the next campaigns is precisely the typological and stylistic break that is observed at the end of Ubaid 0, with ceramic forms (and associated practices) that vanish and decorative motifs (and the associated symbolic or, at least, visual sensibility) that does not persist into the later phases.

***Fig. 2** – Ubaid 0 sherd with paint vertical bands under the rim.*

Ubaid 1 ceramics

The Ubaid 1 pottery from Tell 'Uwaili (2871 fragments collected during the last campaign) is characterised by very fine pastes, generally light beige to whitish in colour. Non-plastic inclusions are almost exclusively mineral, very small-sized and often difficult to detect without a magnifying binocular instrument. They essentially include quartz, feldspars, and grains of flint, radiolarite and chalky rocks. Heavy minerals (amphiboles) are attested exclusively in rare samples with middle-sized vegetal inclusions. Structures of the pastes are dense and micro-grained, with a bubbly vitrified pattern documented just for the specimens subjected to very high temperatures during the firing cycles in the kilns. The firing is highly homogeneous, with slightly smoothed and consistently shaded surfaces on all the portions of the vessels. The presence of slip (always pale beige) is recognisable on a quite limited number of sherds. In other words, from a technical point of view, the differences compared to the assemblage of the previous period are striking. The same applies to morpho-stylistic aspects.

Painted motifs are extremely frequent, generally black or blackish, quite well preserved, often very sophisticated when applied to open shapes (cups, bowls, goblets) and a little less dense when they decorate the surfaces of closed vessels. Jars and bottles are only decorated in their upper part (lip, neck and upper half of the shoulder), while large bowls and dishes are often decorated also on the

inner side with designs showing a great aesthetic quality and finesse. These remarkable decorations are characterised by elegance, clarity of composition and a somewhat miniature taste. On the other hand, the frequent repair holes seem to suggest that the consumers of these vessels were aware of the aesthetic value of these pieces.

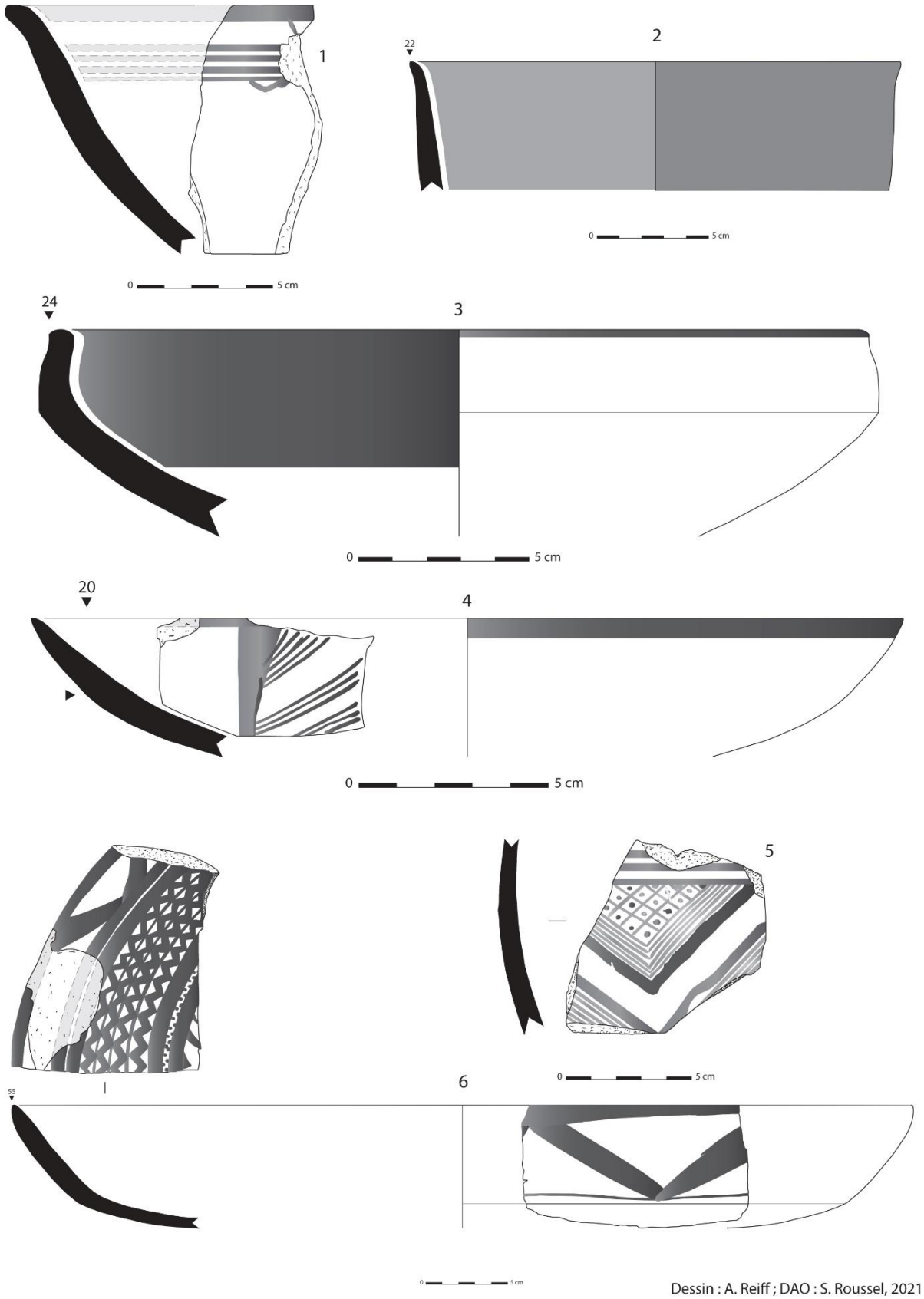

Plate III *– Selection of Ubaid 1 distinctive shapes from Level 4.*

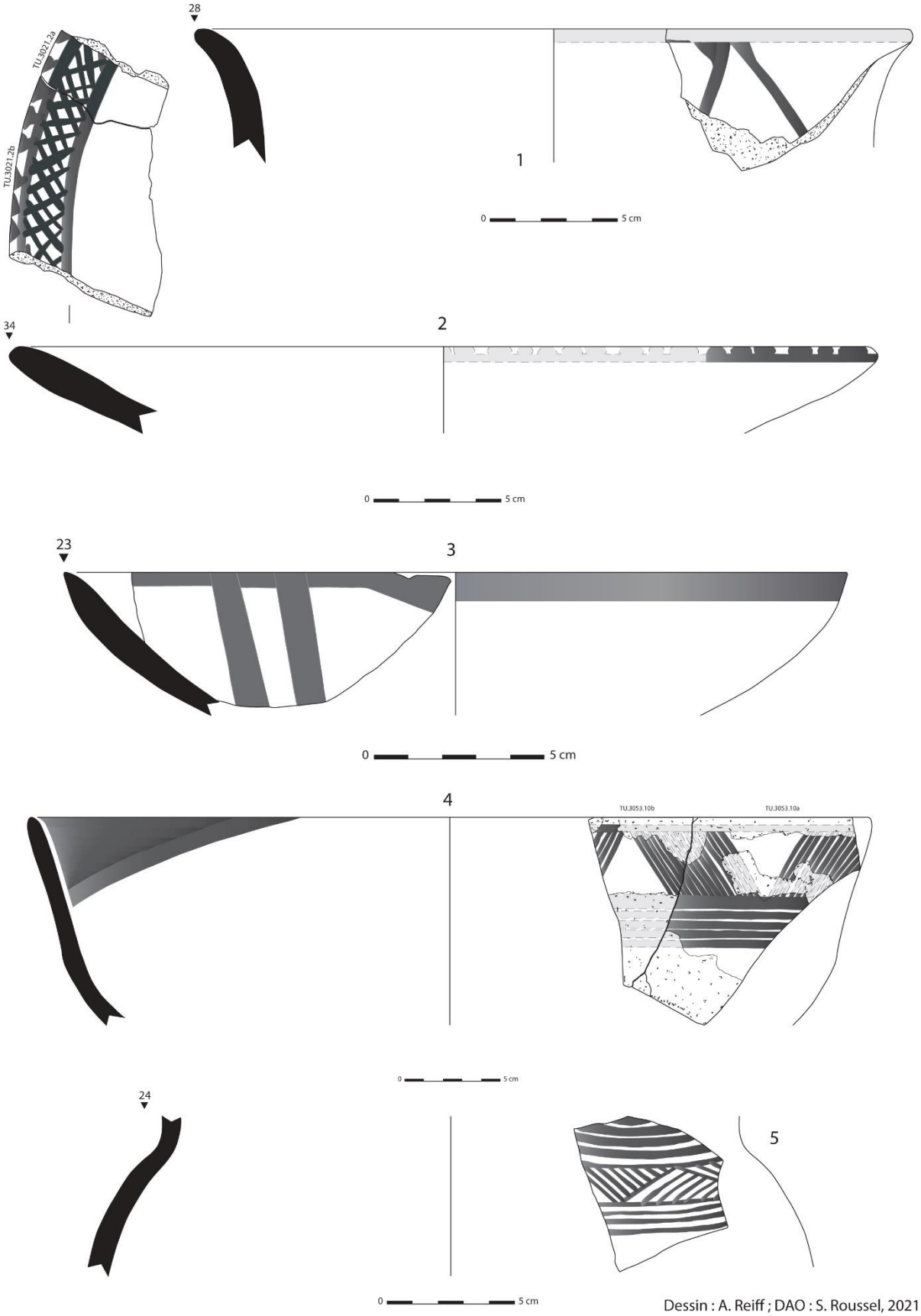

Plate IV *– Selection of Ubaid 1 distinctive shapes from Level 4.*

The morpho-functional typology is much more diversified than in the previous phase. Indeed, not only the general repertoire was quite variegated, but also the firing structures identified in Level 4 were employed to produce any sort of ceramic type: from the finest to the most common ones, a very large range of shapes was fired in each one of the excavated kilns. Among the containers identified during the last campaign, some open shapes belong to large bowls with straight or everted

rim. Those that are deep and have fairly vertical walls often have a slightly flared rim, a semi-globular profile and derive directly from very generic forms that already existed in Ubaid 0 and continue into later phases. But even in these rare cases of continuity, the decorations mark a break and cover large internal and external portions of the vessel (Pl. III.2 – as in Eridu IX-XVII; Ali Mustafa 1981: fig. 97.13, fig. 100.12). Specimens with variable wall thickness and flared edge are a type that appears in Ubaid 1: generally shallower than the upright-walled version, they may have a slight carination towards the middle of the body (Pl. III.1 – as in Hajji Mohammed; Ziegler 1953: Tf.7.1). Cups and shallow bowls with everted walls have thinned rims of variable orientation (more or less flared), but are always extremely open shapes, which in most cases have very conspicuous internal decorations. The latter may have a fairly simple design, which stands out in isolation (Pl. III.4, Pl. IV.3 – Lebeau 1991: pl. V.11), or an intricate composition of lines and triangles that follows the orientation of the rim (Pl. III.6, Pl. IV.2 – Lebeau 1991: pl.V.3; Eridu XV, XIV – Ali Mustafa 1981: fig. 94.4; Ali Mustafa 1981: fig. 91.11) and, from there, expands towards the centre of the bowl, with geometric grids and reserved triangles or bands (Pl. III.5 – Hajji Muhammed; Ziegler 1953: Tf.37b,4). Beakers with straight, slightly inverted or everted rim (Pl. IV.1 – Lebeau 1991: pl. X.1-2; Eridu XVII – Ali Mustafa 1981: fig. 98.29) are pretty fine and large vessels, while tall thin walled carinated beakers (or rather bottles) with everted rim continue a tradition of closed vessels with sinuous profile already attested in the Ubaid 0 (Lebeau 1991: pl. IX). Craters, bottles, high-necked jars with fine everted rim, and neckless globular jars are also attested in Level 4, as well as squat carinated jars. Finally, a well-documented type is represented by medium sized jars, with a short neck and slightly carinated shoulder (Pl. IV.5 – Hajji Mohammed; Ziegler 1953: Tf.l2,u).

***Fig. 3** – Ubaid 1 fragment with net decoration and dots.*

This is essentially the same assemblage (in terms of both shapes and decorations) of Eridu Levels XIX-XV, but clear parallels are also recognisable at Jaffarabad Level 4, Tepe Sabz, Bendebal Period II Level 17 and Tepe Gawra XX-XIX (see for instance the grid or net motif with dots – Pl. III.5 and Fig. 3). Moreover, increasingly heavy and elaborate decorations are reminiscent in some respects of Samarra ceramics, as also of delicate motifs belonging to the so-called "Choga Mami Transitional" style.

A generalised trend is the increasing presence of colour fields. Some (rare) spaced geometric Ubaid 0 decorations persist (such as the oblique criss-crossed stripes, isolated or in groups around the rim or on the shoulder of the jars – Pl. IV.1, 4, 5). Similarly, basic decorations such as bands of paint along the upper part of the rim are conserved (Pl. IV.3). But, at the same time, the intricacies of geometric motifs, the large and thick oblique bands (Pl. IV.4), or even the backgrounds of entire parts (Pl. III.2-3) of the vessels are largely developed in the Ubaid 1 period. More in general, decorations do not only develop on a formal and aesthetic level, but also for the first time seem to assume a properly and entirely symbolic dimension. Not only because the grammar of the compositions becomes increasingly complex compared to the much more geometric and uniform structural pattern of the Ubaid 0 phase (Thissen 1992). But also because some decorations spread even to parts of the vessels that were not always visible or, indeed, were never visible (as on the underside of some bases – Fig. 4).

In the coming campaigns, this aspect will also have to be taken into account to better understand the reasons and mechanisms for the cultural discontinuity between Ubaid 0 and 1.

***Fig. 4** – Ubaid 1 painted decoration (faded but still visible) below the base of a vessel.*

XIII - Preliminary Archaeobotanical Results from Larsa and ʻUwaili

Carolyne Douché

The archaeobotanical investigations initiated in 2019 at Tell el-ʻUwaili and Larsa continued in November 2021. Samples that could not be exported in 2019 were analysed and additional samples were collected during this new fieldwork campaign. By setting up a more systematic sampling strategy to recover plant remains (compared to old excavations) this work aims to increase data to reconstruct agricultural practices and plant consumption in southern Mesopotamia.

Indeed, since excavation were resumed in the region, it offers a great opportunity to apply bio-archaeological and environmental studies. New data obtained from Uwaili and Larsa can be compared to the previous ones, as well as to results from the region, including new data obtained in the North. The new research program of Uwaili-Larsa, directed by R. Vallet, allows research on un- or under-explored periods, fill chronological gaps and provide more detailed information about the archaeological contexts. Previous archaeobotanical work at ʻUwaili provided results on macro-botanical data from the whole Ubaid occupation, from 0 to 5 (Neef 1991), but new fieldwork is more extensive and includes more samples originating from a wider range of contexts. Previous archaeobotanical results from Larsa provided information on the Neo-Babylonian and Hellenistic-Parthian period (Neef 1989), whereas samples collected during the campaign 2021 are earlier and cover the Isin-Larsa, the Old Babylonian and the Kassite periods.

Method

As in 2019, we tried to collect as much soil samples as possible in secured contexts. Due to the important aeolian deposit and dune movements, the first days of the campaign mainly consisted of removing the sand from the trenches and consequently no sample was taken. In 2021, thirty-one samples were collected at Tell el-ʻUwaili and sixteen samples from Larsa. They were processed by flotation, which was carried out at Nasriyah. The flotation was performed as in 2019, using a machine with a 0.3 mm mesh light fraction and a 1 mm mesh heavy fraction screen. To limit the waste of water, a pump allowed a water recycling system. In addition, a few samples were handpicked, particularly if potential plant remains were observed on the field. As an example, at ʻUwaili, a block of sediment was collected in the street 2111 because charred remains were identified. At Larsa, in B49, due to the fire that destroyed the building, the roof burned and collapsed. Charred wooden beams were still arranged *in situ*. According to their position, they were numbered and carefully handpicked by P. Jaccard for future wood charcoal analysis.

The total volume of sediment samples is 198 and 188.75 liters, for ʻUwaili and Larsa respectively. Both fractions were dried in the shadow. The light fraction was preliminary scanned and analyzed under a low-power microscope (Zeiss STEMI 305, x0.8-4.0), whereas the heavy fraction will be checked by eyes in the future. Preliminary identifications were carried out with the help of seed atlases, manuals and archaeobotanical reports. Further work will be carried out at the School of Archaeology (University of Oxford) using the reference collection, including many specimens from Iraq. Counting of plant remains was based on an estimation of a minimum number of individual (MNI): whole seeds were counted as one, but for fragments we estimated the corresponding proportion (1/2, ¼, etc…) and then restituted the total number of whole specimens.

Results from ʻUwaili

At Tell el-ʻUwaili, samples were collected in various contexts including pottery kilns, post-holes, « storage » lockers and streets/alleys. As previously, the density of macro-botanical remains is very low and the preservation is very poor. Charcoal are absent. Seven samples out of the 23 analyzed did not contain any botanical record. Plant remains were mainly preserved by charring, often fragmented – especially cereal kernels - and covered by salt. A total of 133 remains was recovered: only sixty-nine were identified (Fig. 1), eleven could not be identified and fifty-three were too badly preserved and were unidentifiable. The density of remains varies from 0.1 to 55 n/L. As already noticed, the bottoms of pottery kilns, although they are firing structures showing evidence of burning, contain little or no remains.

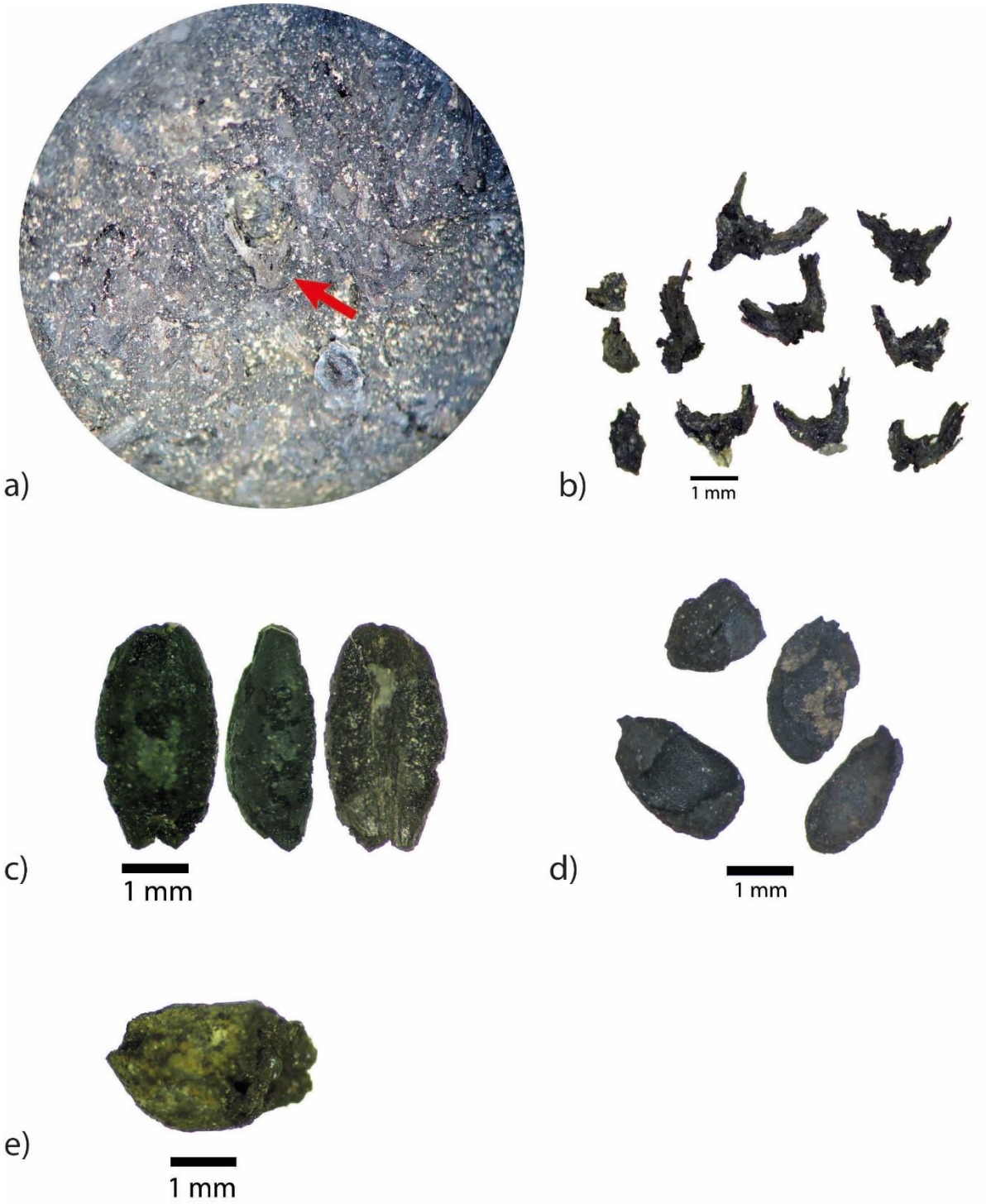

***Fig. 1** – Examples of plant remains recovered at ʻUwaili in 2021. a) Detail of an einkorn spikelet base embeded in the sediment from the street, b) Einkorn chaff remains, c) Barley grain, d) Flax seeds, e) Rodent pellet.*

Due to the very limited number of remains, the results will be presented as a whole, without taking into account the archaeological level. Within the low amount of plant remains, cereal grains and chaff are dominant. Kernels of hulled two-row barley (*Hordeum vulgare* subsp. *distichum*) were identified whereas glume wheat, mostly einkorn (*Triticum monococcum* ssp.) is only represented by chaff remains (glume bases and spikelet bases). Most of the barley grains were recovered in the internal space of Building B110 (on the floor and in the post-hole 2060). Chaff were mostly recovered in the filling of the E-W street 2111, characterized by an accumulation of thin layers of charred deposits. This passage is located between the granaries G2 and the building B110, likely dedicated to storage and food processing. This level 5 is attributed to the Ubaid 0, last level of this phase around the end of the 7th mill. BC, but its precise dating has to be confirmed since we could not export samples for radiocarbon dating (the samples should be exported in 2022). Wild grasses and nutshell fragments were recovered but could not be identified in detail. Interestingly, four seeds of flax (*Linum* sp.) were retrieved in the pottery kiln 2026, recessed into the alley 3027. Considering the linseeds have an oil-rich content (Wilson 1984), they tend to explode when exposed to fire and are usually represented by a few seeds on archaeological sites. For that reason, their presence is usually considered as an evidence for cultivation (Kroll 1993). However, since the specie of the specimens recovered at 'Uwaili has not been identified yet, we cannot say if it was cultivated or not. Single seeds of *Chenopodium* sp., *Dinebra*-type and Juncaceae-type represent wild taxa. In addition, fragments of amorphous residues and a rodent pellet were found in the kiln 2004. A fragment of a food-type residue was found in the internal post-hole of B110.

Results from Larsa

At Larsa, fieldwork occurred in four trenches: PZ (the bridge over the Grand Canal and the Kassite ceramic workshop), B50 (large religious complex), B48 (rectangular house with at least two kitchens) and B49 (large building corresponding to the house of Grand vizier Etellum). As already mentioned, we tried to collect samples in secured deposits, ideally occupation floors but also fill of structures. For that reason, the refill of the room 3019 in B50 that was mostly sandy deposit was not sampled until the bottom was reached. Shells and micro-faunal remains were found in all trenches and contexts, except PZ. Charcoals (>2mm) were found in both areas of B50, and in the room 1598 and the Kassite pit northwest of B49.

Results from Trench PZ

From PZ, only a small sample was collected in association with Kassite jars recovered in the floors of the workshop. The sample was very poor; only three taxa were identified (Fig. 2): a kernel of two-row barley (*Hordeum vulgare* susbp. *distichum*), an indeterminate wild grass and a seed belonging to the Juncaceae family. Since the occupation in this trench is now defined (Zingarello, Bachelot and Hsony, this volume), we will carry out a larger sampling strategy in 2023.

Results from B50

Excavation in this trench began in 2019 and samples were collected, in the filling and the collapse of the room (Locii 3019, 3032 and 3129). Previous analysis of the samples collected in this area indicated barley grains (*Hordeum vulgare* subsp. *distichum*), stem fragments of reed (*Phragmites/Typha*) and wild grass dominated it. This year, we collected two more samples, one above the floor of the room 3019 and another one in the collapse of the room 3094. As previously highlighted, the samples mostly contain grains of two-row barley but also fragments of amorphous

residues (Fig. 2). A single grain of glume wheat was retrieved and a few chaff remains of both, wheat and barley were recovered. In addition, a fragment of date stone was identified. The wild/weed taxa include seeds of *Phalaris* sp., unidentified wild grasses, *Medicago* type *sativa*, *Trifolium*-type, Chenopodiaceae and Cyperaceae (including *Scirpus* sp.).

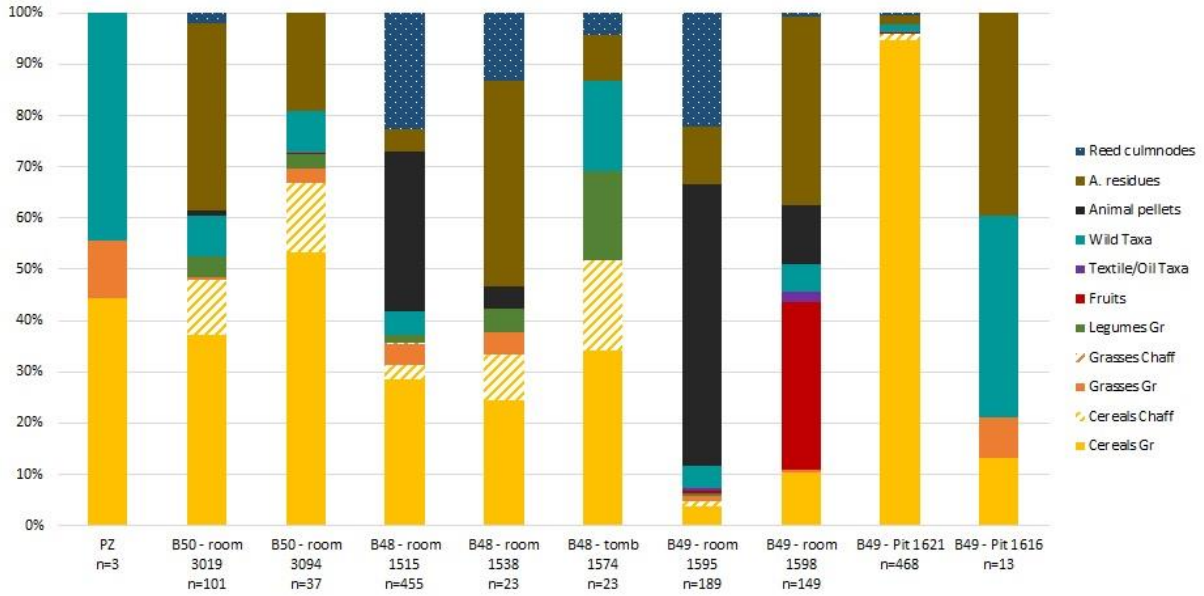

***Fig. 2** – Bart chart showing the archaeobotanical composition from the different archaeological contexts of Larsa. Unidentified and unidentifiable remains are not included. Gr=grains.*

Results from B48

At the beginning of the excavation season, we had the opportunity to analyze four samples collected and processed in 2019 but that were neither analyzed or exported. These are from the burnt fill above the floor of the room 1515 northeast of the building (Jaccard, this volume). The assemblage is very rich (Fig. 2 and 3) and contains a large amount of cereal. Numerous grains were identified as two-row barley (*Hordeum vulgare* subsp. *distichum*) but the wild progenitor *Hordeum vulgare* subsp. *spontaneum* and another wild type were also found. Two grains of free-threshing wheat (*Triticum aestivum/durum*), chaff remains of wheat (including einkorn), as well as a large amount of internal culmnodes of Poaceae - most of them preserved by mineralisation - were recovered. The wild/weed taxa are represented by indeterminated wild grasses, small legumes (*Melilotus/Trifolium*, *Medicago* type *sativa*), Alismataceae, Chenopodiaceae (bractae of *Atriplex* sp., *Salsola*-type), Cyperaceae (including seeds of *Bolboschoenus* sp., *Carex*-type, *Cyperus*-type, but also stem fragments) and *Malva* sp. We also identified many reed culmnodes (*Phragmites/Typha*), dung-type fragments and caprine coprolites, a few rodent pellets and some fragments of food remains (bread-type).

In addition, two samples were collected this year: one in the ashy layer above the floor of the room 1538 and one outside, in the burial of a newborn (1574) in room 1504. Unfortunately, no sample was collected in the room 1531 because the sediment deposit very shallow and sandy. The samples from this trench contain a low amount of remains, represented by some barley (grains and chaff) and einkorn chaff. As for B50, the wild/weed category includes wild grasses, small legumes (*Melilotus/Trifolium*, *Medicago* type *sativa*, cf. *Trigonella*), *Chenopodium* sp., Cyperaceae and Juncaceae-type. Reed culmnodes and caprine coprolites were also recovered in the room 1538.

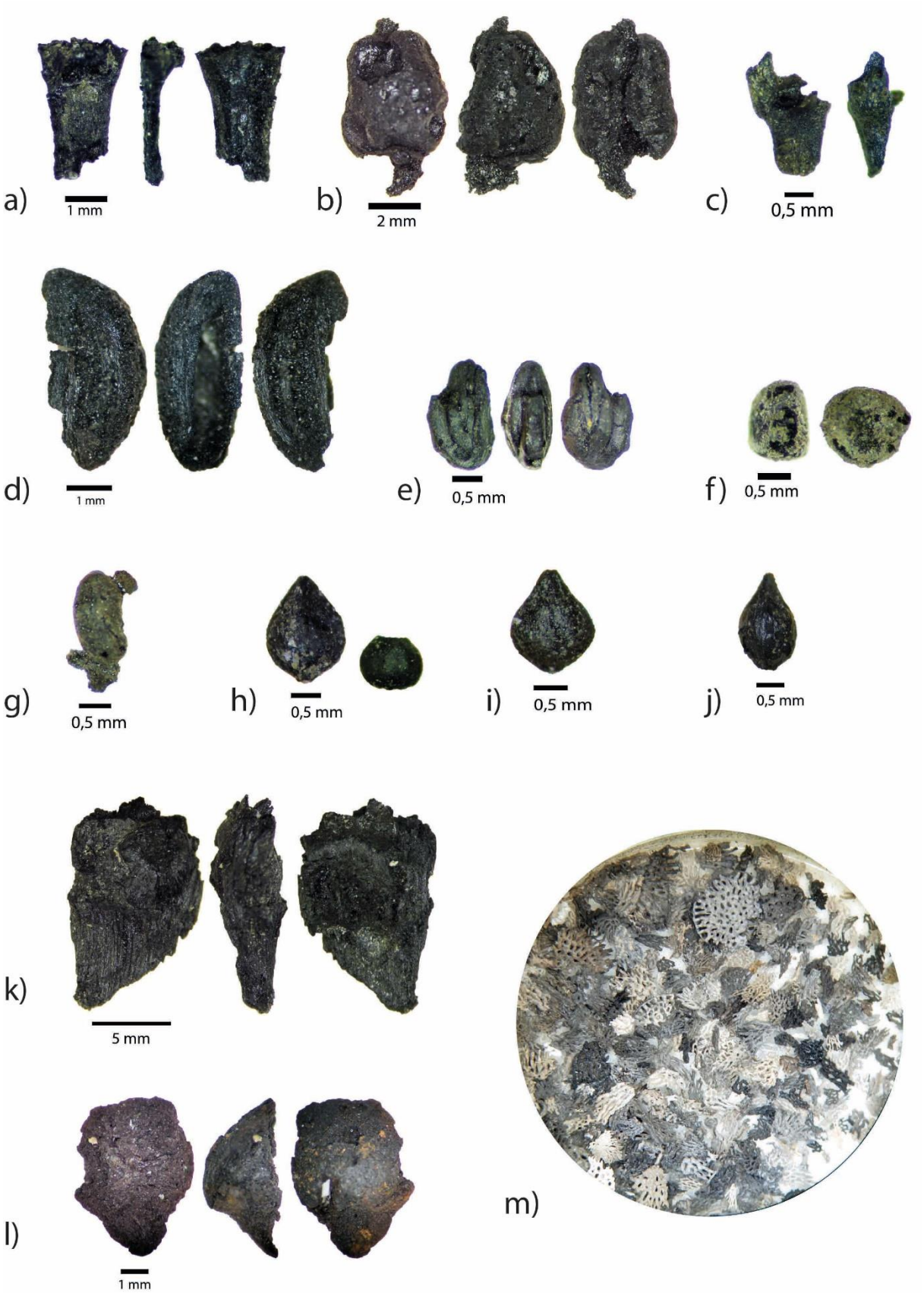

Fig. 3 *– Plant remains recovered from the trench B48 at Larsa. a) Barley rachis, b) free-threshing wheat grain, c) einkorn basal spikelet base, d) Apiaceae, e) Alismataceae-type, f) Malva sp., g) Medicago sp. h) Bolboschoenus sp. achene and endosperm, i) Carex-type, j) Cyperus sp. k) Reed culmnode, l) Fragment of caprine coprolith, m) Internal culmnodes of Poaceae, mineralised.*

***Fig. 4** – Plant remains recovered from the trench B49 at Larsa a) Barley rachis attached, b) Fragment of unidentified nutshell, c) large amount of date stones from the room 1598, d-e) Sesame seeds, f) Scirpus sp. g) Alismataceae, h) Apiaceae, i) Malva sp., j) Large amount of barley grains from pit 1621, k) Rodent pellets from the room 1595, l) fragment of rope (mineralised).*

Results from B49

Five samples coming from the trench B49 were analyzed. Three originated from two rooms (1595 and 1598) of the Isin-Larsa building destroyed by fire in 1895 B.C. This event damaged the structure but favored the preservation of the plant remains, by charring. Two additional samples were collected in pit contexts, one associated with Kassite pottery (1616) and the other one collected in a storage pit (1621), later than B49 and associated with Old-Babylonian pottery.

Room 1595

As suggested by the floor, entirely plastered with a thick layer of bitumen, and the presence of a drain in the center of the room, the locus 1595 can be interpreted as a « bathroom ». The sample collected in the northeast corner was not very rich in plant remains (Fig. 2 and 4), but also contains a large amount of rodent pellets, reed culmnodes and amorphous residues. Barley grains and chaff are attested, as well as a single date stone (*Phoenix dactylifera*) and a single seed of sesame (*Sesamum indicum*). Wild/weed taxa are represented by *Phalaris* sp., *Trifolium*-type, Apiaceae, *Malva* sp. and *Scirpus* sp.

Room 1598

In the room 1598, due to the fire, the carpentry collapsed on the furniture. There, vases and baskets containing tablets and envelops of cuneiform texts were discovered and samples were collected in the ashy layer around. The two samples were particularly rich in plant remains. We found many date stones (*Phoenix dactylifera*), most of them complete (Fig. 2 and 4). We also found two-rows barley grains, possible cappers (*Capparis*-type) and sesame seeds (*Sesamum indicum*). The wild/weed taxa include Alismataceae, Asteraceae, *Malva* sp. and unidentified tuber fragments. Moreover, internal culmnodes of Poaceae (mineralised) and reed culmnode (*Phragmites/Typha*) were recovered. Apart from the plant remains, the samples also contains many fragments that may belong to the architecture. These were shiny, which might be due to the high charring temperature. In addition, as in the room 1595, but in much lower quantity, we identified rodent pellets.

Pit 1621

In the north of B49, an Old-Babylonian pit was recessed slightly later the destruction of the building, entailing its wall. The archaeobotanical composition of the sample collected in this pit clearly indicates it was a storage pit (silo). Although only ¼ of the light fraction was scanned, a total of 443 grains of hulled two-row barley (*Hordeum vulgare* subsp. *distichum*) were recovered associated with a few rachis (Fig. 2 and 4). In addition, the plant remains include some fragments of date stone and pedicel, seed of Cyperaceae, internal culmnodes of Poaceae (mineralised), amorphous residue, reed and wild grass culmnodes.

Discussion

Despite the numerous granaries and the agricultural package recovered at Tell el-'Uwaili (sickles, ploughshares, grinding stones and jars), the main product – the grain – is very rare. Although lentil is attested, the plant economy seems to have been based on the exploitation of two crops: two-row barley and einkorn. The grain may have been stored and processed in this part of the settlement as highlighted by the discovery of a grinding stone and a tannur. However, the precise locations of food consumption have yet to be determined by taking well-located samples within the habitats. Let us hope that future work will shed light on domestic practices. Flax has not been identified to the specie level. The plant could have been used for its edible seeds (that can be eaten raw or ground

into oil) or for the stems that contain fibers. But flax can also grow wild, especially on roadsides and in cultivated fields. The wild grass *Dinebra* type *retroflexa* is considered as a weed of cultivation in southern Iraq, including in the region of Basra (Rechinger and Aellen 1964: 80). Its flowering time occurs in August, so it cannot be an arable weed of cereal fields, which were winter crops.

Although two main occupation periods were identified on the three archaeological trenches of Larsa (the Isin-Larsa Old/Babylonian and the Kassite), similar patterns have been observed. First, the importance of barley (cultivation and consumption) for the inhabitants of lower Mesopotamia, which is described in the cuneiform texts, is confirmed by the archaeobotanical study. Barley grains were consumed as a staple food by human and animals. By the end of the third mill. B.C., barley rations were distributed to the lower classes (Beaugeard 2009). But barley was also widely used to make bread and produce beer (Michel 2009). Two-row hulled barley (*Hordeum vulgare* subsp. *distichum*) is the dominant crop at Larsa, while einkorn wheat is attested but does not seem to have played an important role in the city's economy. N. Miller noticed that einkorn decreased during the urbanization process whereas free-threshing wheat increased (Miller 1991). As already mentioned by R. Neef (1989), the main issue to grow einkorn in southern Iraq would have been the salinity of the soil. It has been suggested that even if the « watertable with its content of salt and free sodium [was] extremely close to the surface », it may not have prevented cultivation (Jacobsen 1982: 83). Taking into account the very bad preservation of the plant remains at Uwaili, the archaeobotanical results suggest the importance of einkorn during the Ubaid period, especially during the Ubaid 0 and 1. The difference in crop preference between the two sites distant from only 4.7km could indicate the gradual salinization of the lands from the 7th to the 2nd millennium B.C. An archive recovered at Girsu (Tello) - located *c.* 40km to the northeast – and dated from *c.* 2400 B.C. explains that the salinization was an issue for the temple's fields (Jacobsen and Adams 1958).

Date stones are attested in B50 but a significant large amount was recovered in B49. Date fruits were consumed in the Persian Gulf from the 6th-5th millennium B.C. onwards (Tengberg 2012) as indicated by the archaeobotanical results from Dalma 11 (Beech and Shepherd 2007), H3 Sabiyah (Beech and Shepherd 2007, Parker 2010) and Eridu (Gillet 1976). At Uwaili, only wood was identified by R. Neef (1991). The plantation (certainly) and the domestication (likely) of the date palm occurred in this region at the latest at the end of the 4th millennium B.C. (Paszke 2019, Gros-Balthazard and Flowers 2021: 56). Despite its economic importance mentioned in cuneiform texts and the numerous depictions on various supports, remains of date stones are not so abundant in Mesopotamia. Contemporaneous recoveries (2nd mill. B.C.), come from Mashkan-shapir where twenty-three date stones were found (M. Charles, pers. comm.) and from Tell ed-Dêr, but only a single charred specimen was retrieved together with five non-carbonized (Zeist 1984). By the 2nd mill. B.C., date palms were growing with pulses in orchards:

« *If a man gives his orchard to a gardener to pollinate* (the date palms), *as long as the gardener is in possession of the orchard, he shall give to the owner of the orchard two thirds of the yield of the orchard, and he himself shall take one third* », Laws of Hammurabi XVI 58-70 (Roth 1995: 94).

During the 2nd mill. B.C. dates were consumed fresh at different stage of maturity, dried, mixed with bread (Tengberg 2009) and transformed into a syrup/honey (Højlund 1990). Later, Neo-Babylonians (1st mill. B.C.) were producing of a type of « beer » from the date fruits (Oppenheim

1994: 158). Some fields and orchards were exploited by the contractors who paid fees to the palace (Charpin 1987b: 114–115). There, the cultivated crops included barley, sesame, dates and pulses.

In the same building B49, four sesame seeds were recovered. Like flax, the seeds of sesame are rich in oil (even more than flax) and tend to explode when exposed to fire (Bedigian 2003). Woosley and Hole report the identification of pollen of sesame (*Sesamum* sp.) on the 7th mill. B.C. site of Ali Kosh, in south-western Iran (Woosley and Hole 1978) but it was domesticated in the Indian subcontinent, likely during the 3rd mill. B.C. Lump of seeds was recovered in the Indus Valley, at the Early Bronze Age sites of Harappa (Bedigian 1985, 1998, 2011, Fuller 2003) and in Central Asia, on the contemporary sites of Miri Qalat and Shahi Tump (Tengberg 1999). Cultivated sesame was introduced in Southwest Asia during the Early Bronze Age, as indicated by the seeds from the mid-3rd mill. B.C. Abu Salabikh (Charles 1993). Cuneiform texts from this period also report that a small quantity of sesame oil was given as part of the ration (Beaugeard 2009). Later, sesame has been identified at Late Bronze Age Tell Sabi Abyad (Zeist 1994) and Tell Schech Hamad (van Zeist 1999, Zeist 2003). During the 2nd mill. B.C., archives from the Palace of Mari document the importation of sesame by boat from Karkemish (Durand 2000: 904) and the use of the oil for food, cosmetic, lighting and perfume (Michel 1996). Sesame was among the resources carried on the King's travels and the Laws of Hammurabi also mention « šamaššammī » as a financial compensation (Roth 1995: 90–91). This contributes to reflect its economic importance for the inhabitants of Mesopotamia. Finally, *c.* 1325 B.C., baskets of sesame seeds were placed as offerings in Tutankhamun's tomb (Vartavan 1990).

Conclusion

On the one hand, even if our results are still weak compared to the efforts we produced for sampling and processing, the new data from Uwaili contribute to the knowledge of agriculture and palaeodiet in southern Mesopotamia during the Ubaid period. These results are particularly important regarding the lack of data available to characterize the plant economy of this period. Excavation of the earliest occupation (level 5) suggests that plant remains can be preserved *in-situ* and indicates the exploitation of barley and einkorn. Depending on the excavation program for 2023, we may continue to reach the Ubaid 0 settlement and pursue sampling to retrieve more macrobotanical remains. In parallel, further work on the identification of taxa will be performed on the already sorted remains.

On the other hand, archaeobotanical results obtained at Larsa are promising. Indeed, new samples collected in *in-situ* contexts were rich and provide new information about the plant production and consumption during the 2nd mill. B.C. Although textual evidence (counts, letters) mention the crops exploited/consumed and the agricultural practices, the translation of plant names is sometimes problematic and information can be missing (Tengberg 2012). Thus, cuneiform texts and archaeobotanical results can be complementary. New preliminary results from Larsa indicate the large consumption of hulled two-row barley and date fruit, but also sesame.

Finally, on both sites, 'Uwaili and Larsa, the marshland environment is evidenced by wild taxa characteristic of wetlands such as *Cyperus rotundus*, *Bolboschoenus* sp., *Scirpus* sp. and *Phragmites/Typha.* Further work on the identification of the taxa will hopefully improve our knowledge of plant management and consumption at the sites and help us to understand the evolution of the plant economy in southern Mesopotamia, from the 7th to the 2nd mill. B.C.

XIV - Photogrammetric surveing and mapping of Larsa and ʻUwaili

Jonathan Lisein

The campaign of autumn 2021 has greatly benefits from the new acquired precise GNSS receivers. Geospatial technology go on evolving quickly, and archeologists has now shifted from total stations to GNSS receivers (satelite position system). For the first time in Larsa and Uwaili, a pair of Emlid Reach RS+ enabled us to measure the location of any points in the archeological sites, with a great efficiency and a high precision (Lisein et al. 2013, Utiugova 2021). This versatile technology has been used for the collection of ground control points, which are required for the photogrammetric workflow. Thus, daily mapping of excavation sector by unmanned aerial vehicle was more accurate and performed with a reduced amount of office labor. In addition, altitude measurements on excavation sector have occasionally been realized with this pair of GPS. Eventually, the installation of topograpic poles which delimitate every squared areas surveyed by geophysical prospection has also beeing eased by these accurate GPS.

In the following section, we start prensenting the materials that was available during this campaign. Then, the daily mapping of excavating sectors by drone is illustrated, providing the aerial orthorectified views so useful regarding the post-excavation localization and description of any archeological item of interest. Finally, our surface prospection survey, with the focus being the improvement of our understanding in canals and rampart localization and interactions, is summarized.

Material and methods

Photogrammetric surveying

State of the art digital photogrammetry is used to produce orthorectified imagery with high geometric accuracy and good absolute georeferencing. The DJI Mavic Air Pro 2 unmanned aerial vehicle serves as drone. The Agisoft methashape software handles the photogrammetric workflow, starting from aerial images and ending with 3D models and orthophotomosaics. The photogrammetric process is quite complex and will not be extensively presented here (see Lisein 2013 for more details). Nevertheless, let us remainder here the biggest challenges of the photogrammetric pipeline. First, the distorsions from the lens of the camera have to be accurately known and removed. Secondly, as multiple imagery acquisition are realized in time at the Larsa and Uweili sites, the consistency of all resulting maps is of prior importance. These two crucial aspects are straightforwardly handled by a proper and accurate absolute georeferencing, by means of a network of ground control points (visible features on the aerial images for wich we have accurate position). Ground control points measurements are realized with differential GNSS surveing, presented in the next section.

Our work during last campaigns (2019) was focused in the mapping and topographic description of the entire site of Larsa and its direct surrounding, covering thus a large extend of a few square kilometers. Many flights at high altitude were performed in order to illustrate the mound under diverse illumination condition. We do not need in 2021 to go on this survey. Nonetheless, one additionnal mapping of Larsa site was performed this campaign, in order to investigate the silting of the site. Photogrammetric surveying have largely focused on the daily mapping of exavation sectors. Flights at low altitude, ranging from 10 to 50 meters above ground level, have resulted in

image blocs of a few dozens images per excavation sector. The quadrocopter is manually piloted in first-person view, which means that the pilot take advantage of the transmitted camera view from the drone. Image capture is triggered manually and image exposition is set in automatic mode.

Differential GNSS surveying

The pair of single frequency GPS receivers is used for Real Time Kinematic (RTK) determination of any location. Figure 1 illustrates the field use of this method. A base GPS is setted up on a known location. The second GPS, called the rover, is mounted on a pole and serves for the topographic measurements. The base sends the GNSS corrections to the rover through radio communication, which enable the position solution (X Y Z) beeing highly accurate in real time (about 1 cm in planimetry and 3 cm in altitude). This kind of devices were previously highly expensive but are now affordable for archaelogical survey (about 1800 EUR).

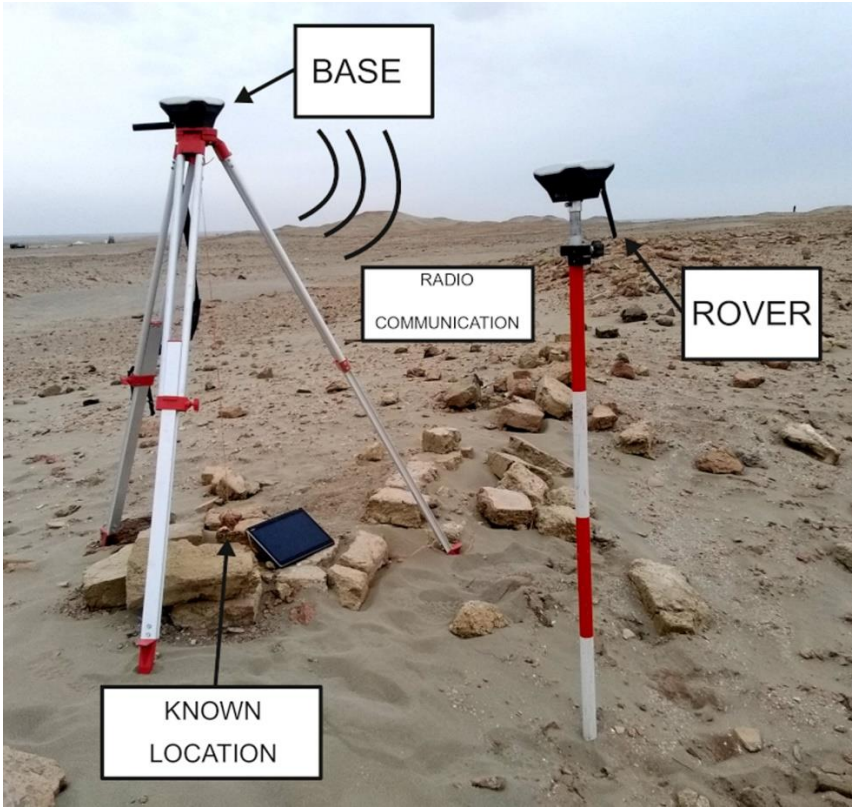

***Fig. 1** - Differential GNSS surveying with a pair of receiver. The base send corrections to the rover. Recording of point location is performed with a tablet connected to the rover.*

Daily excavation site survey

Similarly to the previous campaign, mapping of the excavation sectors were carried out with a frequency of every 2 or 3 days per sector. Thus, orthophotomosaics of the five sectors (trench PZ, buildings 48, 49 and 50 and Uwaili) were computed and consist in permanent documentation of the excavation works. Moreover, these orthophotomosaics of high resolution are of prior importance for the graphical post-excavation works of the archeologists.

Surface prospection and mapping

The surface prospection opperations were mainly focused on the understanding of canals and rampart organization. In addition, the state of silting of Larsa mound is also evaluated through mapping survey on the building 33 and on the Parrot's gates surrounding (where geophysical prospection has given the best result during this campaign). These 2021 maps are then compared with orthophotomosaics of 2019 and dunes movements were localized.

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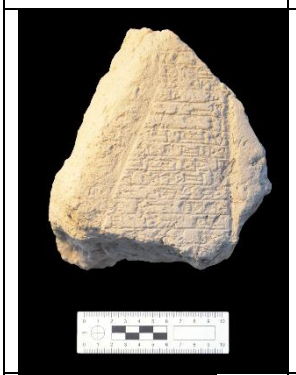
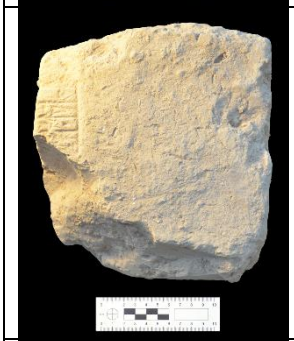
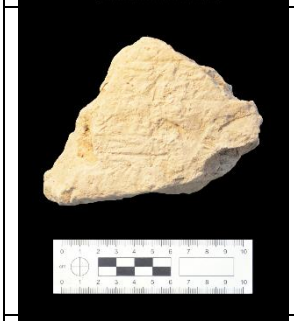
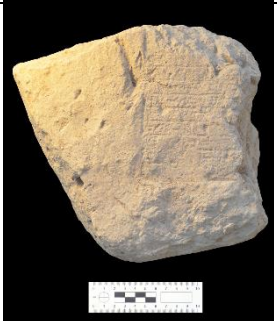
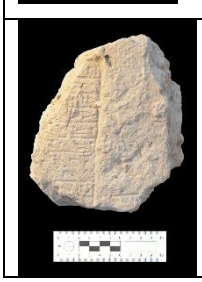
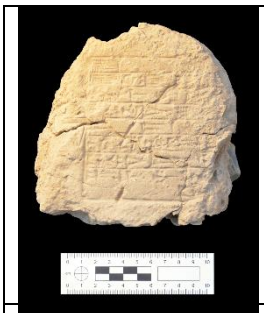
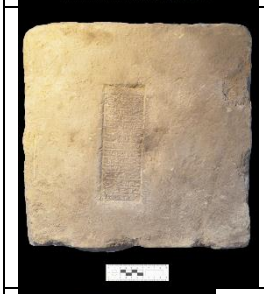
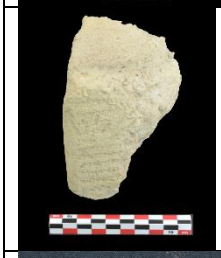
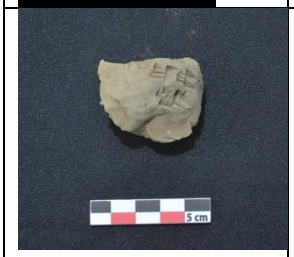
Picture	Museum n°	Field n°	Dimensions	Material	Description	List n°
		TO.TC.3055.1	6.3x5.5x4.3 cm	clay	Uwaili, Obeid 0 clay object, oval shape, with longitudinal groove	130
		TO.TC.3022.1	Diam. : 2.3 cm ; thick. : 1.1 cm	clay	Uwaili, Obeid 0 Lip ornament in clay, circular shaped	131
		TO.TC.3033.1	Diam. : 2.8 cm ; Thick : 1 cm	clay	Uwaili, Obeid 0 Lip ornament in clay, circular shaped	132
		TO.TC.3019.1	Diam. : 2.7 cm ; Thick. 1.8 cm	clay	Uwaili, Obeid 0 Lip ornament in clay, circular shaped	133
		TO.P.3022.2	3.2x2.2 cm	Stone	Uwaili, Obeid 0 stone pendant, oval shape, with circular perforation at one end	134
		TO.TC.3052.1	Diam. : 2.8 cm ; Thick. : 0.8 cm	Clay	Uwaili, Obeid 0 clay counterweight, circular shape, with perforation on one side	135
		TO.TC.3025.1	Diam. : 2.8 cm ; Thick. : 1.2 cm	Clay	Uwaili, Obeid 0 Lip ornament in clay, circular shaped	136

Picture	Museum n°	Field n°	Dimensions	Material	Description	List n°
		TO.P.3034.1	2.4x1.6cm	stone	Uwaili, Obeid 0 Diamond shaped stone bead with perforations on the small sides	137
		L.W.3145-01	4,7x5cm	Terracotta	Larsa, Trench B50 Undated (surface) Terracotta plaque showing a naked man	138
		L.AC.3110-04	2,5x2,5cm	Fired clay	Larsa, Trench B50 – Room 3019 Old-Babylonian Fired clay dice	139
		L.POT.3086-01	8x21,7x10,5 cm	Pottery	Larsa, Trench B50 – Room 3019 Old Babylonian “Larsa” Goblet	140

		L.W.3135-01	24,5x11x7,5 cm	Pottery	Larsa, Trench B50 – Room 3094 Old Babylonian Beaker with ovoid body and convex base	141
		L.W.1058-01	Diam. : 10 cm ; Thick : 5 cm	Pottery	Larsa, trench B48. Old Babylonian Small bowl with profiled rim and string-cut base.	142
		L.P.1057-01	1x0.5 cm 0.5x0.2 cm	Stone	Larsa, trench B48. Carnelian beads found in the filling of an Isin Larsa tomb.	143

		L.P.1085-01	1x0.2cm 0.2x0.1 cm 0.1x0.1 cm	Stones	Larsa, trench B48. Undated stones beads found on the surface of the building B48.	144
		L.P.Surface-1	6.8x3.8x3cm	White limestone	Larsa, B33, surface Early Dynastic III Fragment of an Early Dynastic III stone plaque depicting a bearer of offering (possibly a bundle of reeds)	145
		L.Tc.4039-1	10x5.6x2cm	Terracotta	Larsa, Trench PZ Old Babylonian terracotta plaque depicting two figures facing each other wearing a different dress (probably a king and a goddess)	146
		L.POT.Surface-1	12cm height 6.5cm diam. max 4cm rim diam.	Pottery	Larsa, Undated (surface) Small bottle with an ovoid elongated body and foot base	147
		L.BCR.3086.1	Height: 13cm Length: 12cm Width: 9.5cm	Unbaked clay	Larsa, stamped brick, unbaked clay. Sin-iddinam inscription.	148
		L.BCR.3086.2	Height: 10cm Length: 15.5cm Width: 9cm	Unbaked clay	Larsa, stamped brick, unbaked clay. Sin-iddinam inscription.	149

		L.BCR.3086.3	Height: 22cm Length: 25cm Width: 11cm	Unbaked clay	Larsa, stamped brick, unbaked clay. Sin-iddinam inscription.	150
		L-BCR-3090-1	Height: 12cm Length: 19cm Width: 9.5cm	Unbaked clay	Larsa, stamped brick, unbaked clay. Sin-iddinam inscription.	151
		L-BCR-3090-2	Height: 9cm Length: 8.5cm Width: 9cm	Unbaked clay	Larsa, stamped brick, unbaked clay. Sin-iddinam inscription.	152
		L-BCR-3097-1	Height: 8cm Length: 7cm Width: 6.5cm	Unbaked clay	Larsa, stamped brick, unbaked clay. Sin-iddinam inscription.	153
		L-BCR-3102	Height: 19cm Length: 18cm Width: 10cm	Unbaked clay	Larsa, stamped brick, unbaked clay. Sin-iddinam inscription.	154
		L-BCR-3110-1	Height: 21cm Length: 19.5cm Width: 8cm	Unbaked clay	Larsa, stamped brick, unbaked clay. Sin-iddinam inscription.	155
		L-BCR-3110-2	Height: 13.5cm Length: 11cm Width: 10cm	Unbaked clay	Larsa, stamped brick, unbaked clay. Sin-iddinam inscription.	156

		L-BCR-3110-3	Height: 12cm Length: 11cm Width: 6cm	Unbaked clay	Larsa, stamped brick, unbaked clay. Sin-iddinam inscription.	157
		L.BC.4031.2	Height: 33cm Length: 34cm Width: 8cm	Baked clay	Larsa, stamped brick, unbaked clay. Sin-iddinam inscription.	158
		L.Surface	Height: 7cm Length: 8.5cm Width: 10.5cm	Baked clay	Larsa, Prism (Nabuchodonos or inscription)	159
		L-Tab-1079-1	36×44×43 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of inscribed label	160
		L-Tab-1080-1	18×25×16 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	161
		L-Tab-1080-2	21×21×10 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	162
		L-Tab-1080-3	30×33×20 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of inscribed case	163

		L-Tab-1080-4		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of Fragments of inscribed case	164
		L-Tab-1080-5	34×15×8	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case with seal	165
		L-Tab-1080-6	15×15×6 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case with seal	166
		L-Tab-1080-7		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of fragments of case with the seal of Ikun-piša	167
		L-Tab-1080-8		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of 2 fragments of case with the seal of Ikun-pi-Ištar	168
		L-Tab-1080-9		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of fragments of tablets and cases with the seal of Etellum	169
		L-Tab-1080-10	23×21×12 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	170

		L-Tab-1080-11		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of fragments of tablets and cases with the seal of Išme-Sin	171
		L-Tab-1080-12	43×45×8 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case	172
		L-Tab-1080-13	61×43×22 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Tablet and fragment of case. Administrative	173
		L-Tab-1080-14	42×42×22 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	174
		L-Tab-1080-15	17×30×18 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	175
		L-Tab-1080-16	47×37×18 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Tablet and fragments of case	176
		L-Tab-1080-17	42×35×9 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case	177

		L-Tab-1080-18	57×45×23 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	178
		L-Tab-1080-19	58×41×19 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Tablet and fragment of case	179
		L-Tab-1080-20	33×25×20 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	180
		L-Tab-1080-21	61×43×19 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	181
		L-Tab-1080-22		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of 2 fragments of letter	182
		L-Tab-1080-23	54×30×11 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	183
		L-Tab-1080-24		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of fragments of case	184
		L-Tab-1080-25	30×29×17 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	185

		L-Tab-1081-1	19×36×18 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	186
		L-Tab-1081-2	23×18×8 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case with the seal of Ikun-pi-Ištar	187
		L-Tab-1081-3		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of fragments of tablet and case	188
		L-Tab-1081-4	46×34×8 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case	189
		L-Tab-1081-5	15×27×14 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet. Administrative	190
		L-Tab-1081-6	31×19×14 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet. Contract	191
		L-Tab-1081-7	33×14×12 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	192

		L-Tab-1081-8	30×45×18 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	193
		L-Tab-1081-9		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of fragments of tablet and case	194
		L-Tab-1081-10	19×35×10 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	195
		L-Tab-1081-11	78×58×26 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Tablet	196
		L-Tab-1081-12	28×32×17 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case	197
		L-Tab-1081-13	24×26×17 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet.	198
		L-Tab-1081-14	25×27×9 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case	199
		L-Tab-1081-15	14×20×7 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case	200

		L-Tab-1081-16	19×25×7 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case	201
		L-Tab-1081-17		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of fragments of case	202
		L-Tab-1081-18		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of fragments of case	203
		L-Tab-1081-19	42×24×9 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case	204
		L-Tab-1081-20	24×31×13 mm	Clay	Larsa, Trench 49 Room 1598. Isin-Larsa Fragment of cuneiform tablet.	205
		L-Tab-1084-1		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of fragments of case with the seal of Ikun-pi-Ištar	206
		L-Tab-1084-2		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of fragments of case with the seal of Etellum	207

		L-Tab-1084-3	28×18×7 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case of letter	208
		L-Tab-1084-4	28×36×19 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	209
		L-Tab-1084-5	78×43×25 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Tablet and lot of fragments of case. Contract	210
		L-Tab-1084-6	56×40×20 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Tablet	211
		L-Tab-1084-7	21×18×5 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case	212
		L-Tab-1084-8		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lot of fragments of tablet	213
		L-Tab-1084-9		Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Lots of fragments of tablet and case	214

		L-Tab-1084-10	30×41×21 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	215
		L-Tab-1084-11	44×24×8 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	216
		L-Tab-1084-12	8×11×7 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case	217
		L-Tab-1084-13	34×20×11 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of case	218
		L-Tab-1084-14	24×35×22 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	219
		L-Tab-1084-15	25×37×24 mm	Clay	Larsa, Trench 49 – Room 1598. Isin-Larsa cuneiform tablet. Fragment of tablet	220

Appendix B – Museum List Spring 2022

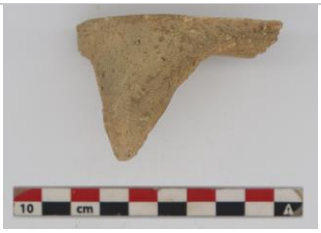
Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.AA15.TP85.A	pres. h 9,9, pres. w 3	44	clay	fragment of clay cylinder (?) with cuneiform inscription	221
		L.S42..A	diam 3,4; pres. h 4,1; main hole diam 0,5	20	clay	"fake" incense or pipe vessel, with 4 fake holes and 1 central hole	222
		L.AA19.TP93.A	pres. l 7; pres w 5,3; bed th 0,9; foot h 4,7	65	clay	undecorated part of model bed	223
		L.T19.TP75.A	square side 7,8; h 9; cup depth 3; holes diam 0,6	300	clay	cubic incense burner. Faces with geometric decoration and two small (attachment ?) holes near the top on each face	224
		L.U18.TP58.A	l 11; body h 3,1; max w 5,2	216	clay	animal figurine (of an equid ?), maybe part of a chariot model	225

Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.AH18.TP80.A	base "knob" l 3; holes diam 0,6	19	clay	base of a very thin vessel with two perforations and a horizontal bar	226
		L.J15.TP37.A	pres. l 6,9; max pres. diam 3	57	clay	clay decorative cone fragment	227
		L.AB34.TP122.A	pres. h 4,8; w 3,4; th 1,2	19	clay	plaque with female figure, hands on belly	228
		L.W24.TP110.A	pres. l 6,5; body h 2,6; max pres. w 3,3	65	clay	non-identified animal figurine	229
		L.R23..B	pres. h 1,8; diam 2,1	7	stone	Marble object with two perforations	230
		L.S17.TP59.A	l 3,1; max w 1,8; depth 1,6	14	clay	handle for vessel or object	231
		L.OTP1.C	diam 1,4; th 0,6	8	carnelian	big red carnelian bead	232
		L.Y15.TP84.A	pres. h 7; top w 7,3; th 2,3; top holes diam 0,7	90	clay	plaque with a divinity, the sun (or a star ?) and the moon	233

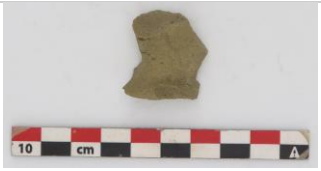
Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.AB15.TP85.A	pres. h 5; pres. w 4,8; th 2,1	55	clay	plaque with female figure holding breast	234
		L.AD21.TP98.A	4,6 * 6,9 * 3,2	98	clay	fragment of a chariot or architectural model	235
		L.T25.TP165.A	l 5; th 0,9; central hole diam 0,6	27	stone	Rounded-square stone pierced object, possibly a weight	236
		L.AB12.TP79.B	pres. h 2,6; w 1,6	11	clay	fragment of a figurine head	237
		L.AC13.TP79.B	diam 3; h of miniature handle 0,7	<1	clay	miniature lid with tiny handle	238
		L.AB14.TP84.A	pres. l 11,5; th 3,5	168	clay	animal model from a chariot or architectural model ?	239
		L.AB35.TP25.A	pres. h 6,6; w 4; th 1,8	47	clay	plaque with female (?) figure, hands on belly	240

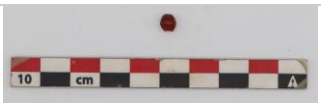
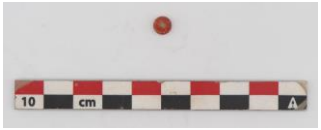
Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.AD12.TP77.A	diam 5; central hole diam 1,3	77	clay	basalt macehead	241
		L.AB14.TP85.A	l 9,6; th 4,3	111	clay	fragmentary animal figurine	242
		L.AB12.TP79.A	pres. l 10,7; diam 3,8	200	clay	fragment of a chariot or architectural model, or large handle of unusual vessel	243
		L.I18.TP33.A	pres. l 8; max pres. diam 2,3	35	clay	clay decorative cone fragment	244
		L.R30.TP166.A	pres. l 2,2; w 1,2; th 0,8	2	stone and faïence (?)	blue bead with "sundisc" motive (red, black, white). Shape adapted for inscrustation (in statue, for example)	245
		L.R32.TP131.A	diam 0,5; th 0,6	<1	carnelian	small red carnelian bead	246
		L.Z35.TP25.A	pres. l 1,3; max diam 0,8	<1	glass ?	black and white bead with geometric decoration	247
		L.B18.TP33.A	diam 0,7; th 0,3	<1	stone	small white bead (limestone ?)	248
		L.Z29.TP106.A	diam 0,6; th 0,5	<1	carnelian	small red carnelian bead	249

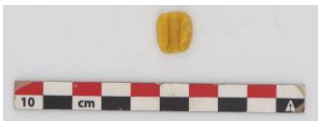
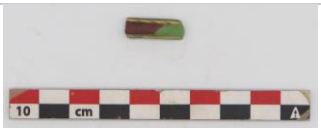
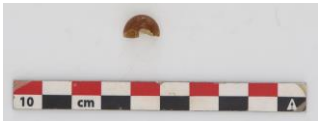
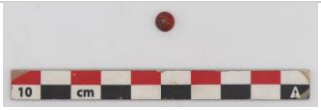
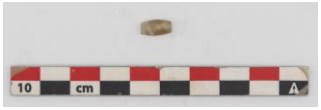
Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.R31.TP166.B	diam 1,4; central hole diam 0,4; th 1,2	3	stone ?	yellow stone (?) bead	250
		L.R31.TP166.A	diam 1,7; central hole diam 0,6; th 1	4	glass	silver-looking glass bead	251
		L.R21.TP57.A	pres. l 1,9; th 0,3; w 0,6	2	glass	fragment of multicolor glass	252
		L.X31.TP125.B	diam 1,2; th 0,9; central hole diam 0,2	2	glass	orange glass bead	253
		L.I10.TP38.B	diam 0,6; th 0,2	<1	carnelian	small red carnelian bead	254
		L.X31.TP125.A	diam 1cm; central hole diam 0,5	5	faïence	blue faience bead	255
		L.R28.TP166.A	diam 0,6; th 0,3	<1	carnelian	small red carnelian bead	256
		L.D15.TP33.A	l 1; max diam 0,5; min diam 0,3	<1	stone	small oval bead in transparent stone (rock crystal ?)	257
		L.B15.TP33.A	h 2,8; diam 1,4	3	stone	cylinder with central hole, but no visible decoration on surface. Limestone	258
		L.R23.A	l 3,1; h 2,3; w 1,6	8	clay	small ram figurine	259
		L.A22.TP34.A	pres. l 13,5; main part diam 4,6	296	clay	fragment of a model. It can be a building, or a very big chariot	260

Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.V16.TP67.B	pres. w 6,2; pres. h 5,1; holes diam 1,2	78	clay	possible part of a model chariot	261
		L.A23.TP34.A	pres. l 7,4; pres w 6,5; pres h 4,2; wheels attachment parts diam 2,3	90	clay	central part of a model chariot	262
		L.AD28.TP99.A	pres. w 8,6; max diam 2,4; pres. l 5,1	94	clay	front part fragment	263
		L.Z22.TP117.A	max diam 10; central hole 1,4; max th 2,8; med th 0,8	100	clay	model wheel with reinforced central hole	264
		L.AD23.TP94.A	diam 7,8; central hole 0,8; max th 2,9; med th 1,4	83	clay	model wheel with reinforced central hole	265
		L.A20.TP32.A	pres. diam 16; central hole diam 2,5; max th 6,3; med th 1,7	281	clay	huge "model wheel" with reinforced central hole	266

Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.AB24.TP105.A	max diam 9,2; central hole diam 0,9; max th 3,1; med th 1,3	105	clay	model wheel with reinforced central hole	267
		L.V28.TP127.A	diam 6; central hole diam 0,7; th 1,1	52	clay	pierced token, made from body sherd	268
		L.AB18.TP93.A	diam 5,3; central hole diam 1,1; th 1,5	34	clay	pierced token	269
		L.H14.TP36.A	l 1,9; w 2,3	<1	clay	ring scraper: small part of small and thin vessel, cut after firing, and possibly used as an "estèque" by potters	270
		L.X28.TP127.A	pres. l 15,6; th 1,2	112	clay	clay sickle handle	271
		L.G17.TP33.A	pres. l 11; th 1,6	66	clay	clay sickle handle	272
		L.AH24.TP92.A	pres. l 12; th 1,4	88	clay	clay sickle blade	273

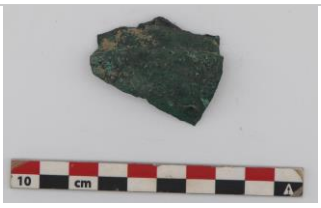
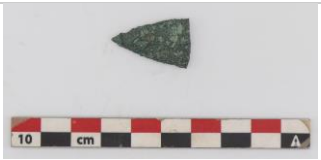
Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.X25.TP117.A	diam 5,5, central hole diam 0,7; h 2		stone	small stone pierced weight	274
		L.R20.TP56.A	diam 5,5; central hole diam 1,5; th 2,1	51	clay	clay small pierced weight	275
		L.AB13.TP84.A	l 6,2, max th 1,6, max w 2,5	72	copper or bronze	bronze "half-face", originally incrusted ?	276
		L.AA32.TP121.A	l 4,1; w 1,7; th 0,4	<1	copper or bronze	bronze arrow or spearhead	277
		L.AE24.TP94.A	th 0,1	11	copper or bronze	copper thin bowl with low carination	278
		L.Z31.TP124.A	pres. l 2,5, max w 1,7, th 0,4	<1	copper or bronze	bronze arrow or spearhead	279
		L.AA14.TP84.A	l 3; max diam 0,7	7	copper or bronze	copper model ?	280
		L.B16.TP31.A	pres. h 3,4, diam 1,7	<1	copper or bronze	weapon socket ?	281
		L.AE24.TP94.B	diam 2,2, th 0,5	7	copper or bronze	bronze ring	282

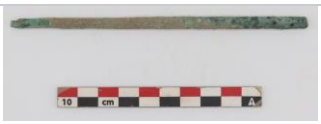
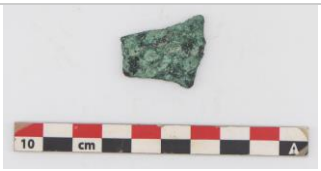
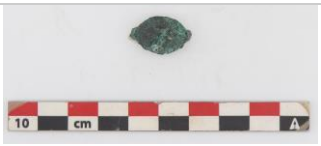
Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.Z25.TP106.A	pres. l 14,6; diam 0,5	25	copper or bronze	copper pin ?	283
		L.Y31.TP123.A	l 7,2; w 2,1; th 1,1	26	copper or bronze	bronze arrow or spearhead	284
		L.AI33..E	pres. l 2,5; th 0,6; w 0,6; hole diam 0,2		stone	stone miniature axe ?	285
		L.AI33..F	w 1,5; diam 0,2		copper or bronze		286
		L.AI33..M			copper or bronze		287
		L.AI33..K			copper or bronze		288
		L.AI33..D	pres. l 10,6; max diam 0,6		copper or bronze		289
		L.D'22..A	l 3,8; max w 1,6; th 0,4	8	copper or bronze	copper miniature axe	290
		L.AG22.TP90.A	h 1,8; diam 0,9	3	stone	cylinder seal with geometric motives, dark green stone	291
		L.X4.OTP1.A	h 2,5; diam 2,8	4	lapis lazuli	cylinder seal with geometric motives, lapis lazuli	292

Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.AB11.TP79.A	pres. h 6,2; med w 2,1	39	clay	anthropic figurine head	293
		L.S22.TP113.A	base diam 7,7; rim diam 7,2; max h 5,9	116	stone	thin limestone bucket	294
		L.R34.TP28.A	diam 20; central hole diam 0,8; h 9,3	5000	stone	basalt grinding wheel with central hole	295
		L.W29.TP128.A	diam 9,5; lug max diam 3	1000	stone	basalt grinding wheel with central conic lug	296
		L.U30.TP115.A	base diam : 5,7; pres. h : 8,7 cm; max diam 7,8	158	clay	goblet with cuneiform individual name	297
		L.T35.TP130.A	base diam : 6; pres. h. : 4,2	131	clay	goblet with cuneiform individual name	298

Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.Q35.TP28.A	base diam : 6,5; pres. h : 7,2	254	clay	goblet with cuneiform individual name	299
		L.M34.TP157.A	base diam : 6; pres. h. : 7,5	205	clay	goblet with cuneiform individual name	300
		L.R31.TP167.A	base diam : 7; pres. h. : 5,9	87	clay	goblet with cuneiform individual name	301
		L.W30.TP128.A	base diam : 75,9; pres. h. 7,3	121	clay	goblet with cuneiform individual name	302
		L.W34.TP130.A	base diam 5,9; pres. h 9,3	89	clay	goblet with cuneiform individual name	303

Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.R34.TP28.C	base diam 7,7; pres. h 6,3	138	clay	goblet with cuneiform individual name	304
		L.R33.TP28.A	pres. base diam 5; pres. h 5,7	157	clay	goblet with cuneiform individual name	305
		L.V16.TP60.B	pres. w 14; pres. l 15,5; th 7,6	2500	clay	inscribed brick with part of rectangular cuneiform inscription on one face	306
		L.R32.TP167.A	pres. l 19; pres w 14,5; th 6	1900	clay	inscribed brick with part of rectangular cuneiform inscription on one face	307
		L.D12.TP36.A	pres. w 21; pres. l 20,5; th 6	3000	clay	inscribed brick with part of rectangular cuneiform inscription on one face, and two cat (or goat ?) paws traces	308

Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.AE26.TP94.A	pres. w 11; pres. l 11; th 3,6	423	clay	inscribed brick with part of rectangular cuneiform inscription on one face	309
		L.J12.TP38.A	w 7,2; pres. l 5,3; pres. th 5,5	245	clay	inscribed brick with part of rectangular cuneiform inscription on one face	310
		L.O23.TP113.A	base diam 6,3; pres. h 9,7	223	clay	goblet with cuneiform individual name	311
		L.N31.TP163.A	pres. h 12; base diam 6	290	clay	goblet with cuneiform individual name	312
		L.N25.TP182.A	base diam 6	211	clay	goblet with cuneiform individual name	313

Photo	Museum n°	Field n°	Dimensions	Weight	Material	Description	List n°
		L.AG25.TP91.A	pres. l 1,4; w 1,2; th 0,1	<1	nacre	nacre inlay, shaped as a fish	314
		L.AA32.TP121.C	feet h 1,5	45	clay	clay miniature tripod	315
		L.D'22..C	base diam 1; pres. max diam 4,2; h 2,6	13	clay	miniature bowl	316