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Since the last full season of excavation in 1999, the Institute of Archaeology at Andrews University has undertaken three additional expeditions to Tall Jalul as part of the Madaba Plains Project. The first expedition was a brief two-week season, undertaken in 2000, in which a new field of four squares, designated as Field E, was opened immediately north of Field B on the east side of the tall (Figure 1). However, this was primarily intended as a field-training exercise for a small number of graduate students from Andrews University and did not penetrate below the first few centimeters of surface debris. Although only surface debris was removed and no significant stratigraphic layers were exposed, two ancient seals were, nevertheless, found in the debris that we will report on here. A second field excursion was conducted in the spring of 2004, but again the work in this season did not involve any significant excavation. Rather, the goal was to remap both the topography of Jalul, as well as its architectural features, using a new geographical positioning system known as Z-Max. Our third excursion was undertaken between May 4 and June 16, 2005, the first regular excavation season since the 1999 season. In this report, therefore, while we will report on the results of all three of these expeditions, since there were no significant excavations in 2000 and 2004, we will focus primarily on the results of the 2005 season.

The 2000 Season

The 2000 season lasted from April 24 to May 6, and involved a small number of students from Andrews University, who were participating in an archaeological tour led by Jiri Moskala (Figure 2). In order to give the students

1Staff for the 2000 season included Randall W. Younker and David Merling (co-directors), Paul Ray (field supervisor), and Efrain Velazquez, Patrick Mazani, Robert Bates, and Elias Brasil de Souza (square supervisors). Jiri Moskala was in charge of field
field experience, it was decided to open up a planned new field north of Field B. The new field, designated as Field E, was selected because it included a very large mound, the highest point of Jalul’s “lower city,” which showed promise of concealing a major architectural feature, perhaps a tower along Jalul’s northeastern wall. Four squares were laid out in a straight line along the east-west axis of Jalul’s excavation grid (Figure 1). Because excavation lasted only two weeks, none of the squares penetrated much below surface debris. In the eastern-most squares, Bedouin graves were exposed just below the surface (as was the case in Fields A and B in previous seasons). The remains were reinterred by local workers on the acropolis of Jalul, where a modern cemetery has been maintained by the local village.

The ceramics found in the surface debris were unsurprisingly mixed, coming from different periods, although the vast majority of sherds were from the late Iron II Age—apparently close to the last period of major occupation on the tell. Although no architectural features were exposed this close to the surface, a number of small finds were recovered. The thirty-one recovered objects included iron arrowheads, stone ballista, fragments of various basalt vessels, stone beads, a ceramic pendant, a ceramic button or “buzz,” a metal fibula, a metal pin, a metal needle, a number of stone blades, a ceramic figurine head, spindle whorls, and two seals.

Of the two seals, one was light blue (faience) with a geometric design. The second seal was found just below the surface in Square 4 in an area that had been heavily disturbed by nineteenth-century Bedouin graves (Figure 3). It is of a whitish stone and is inscribed with Egyptian hieroglyphics. One of the square supervisors, Robert Bates, provided a preliminary reading as follows: “Amun-Re, Re of the Two Lands.” It dates to the time of either Ramesses III or Ramesses IV of the 20th Dynasty.

The 2004 Season

The goal of the May 10-22, 2004 season at Tall Jalul (5 km east of Madaba) was to test a new Geographical Positioning System (GPS) known as “Z-Max” (Figure 4). The Z-Max surveying system, produced by Thales Navigation, is a precision GPS system originally designed for topographic and construction survey. Z-Max is superior to other GPS systems because of ADAPT-RTK (Automatic Decor Relation and Parameter Tuning for Real Time Kinematic). This new system, which has the capability of locating three dimensional points (latitude, longitude, and elevation) on the surface of the planet within an accuracy of centimeters, had previously been shown to be extremely accurate and reliable in plotting the specific location of individual bones of dinosaurs in a paleontological excavation conducted in northeast Wyoming, U.S.A. by Art Chadwick and Larry Turner of Southwestern Adventist University, Keene,
Texas. One of the characteristics that makes this new system so attractive for archaeological field work is that it is extremely fast. A given locational point can be recorded literally by a click of a button, and the locational point is immediately recorded. By way of illustration, Chadwick and Turner were able to record thousands of locational data points at Tall Jalul in just two days to create an accurate topographical map of the site at 1 m intervals (Figure 6). These data points can be read on a small screen that is attached to the receiver and are immediately recorded by the unit's computer.

When the locational data from ZMax are downloaded into a computer software program called ARCGIS, the recorded data can be combined with digital images of various archaeological features (e.g., bones, rocks) to create three-dimensional images of those features. The software has the capability to compensate for any distortion created by the digital image and maintains the precise spatial relationships of those features. Thus, for example, when several locational datum points (length, width, depth) for each of several individual paving stones in a street are combined with a digital image of those same stones, it is possible to create a three-dimensional model of those stones that are in precise spatial relationship to each other. The software can then be manipulated to provide a view of those stones from any desired angle. Images of architectural features and other objects generated by this software can be viewed on a computer from any desired angle, greatly enhancing the ability to analyze and understand any given feature. Such images can also be used in publication.

The application of this new technology to archaeology is immediately obvious. With ZMax and ARCGIS, any locus point on an archaeological site can be quickly and accurately plotted—including the parameters of individual loci or features, such as a wall or street, as well as the precise location of any find spot of a given artifact.

Results of the 2004 Season

In preparation for the replotting and mapping of Jalul, a dozen students and teachers from Andrews University (Figure 5), along with four workers from Jalul, cleaned the debris from all the previously excavated fields that had accumulated since the last excavation seasons in 1999 and 2000. During the cleaning process, they also removed a dangerously eroded balk in Field B so that no visitors to the site would be endangered. The removal of the balk exposed a few additional pavement stones from the eighth-century-B.C.E. pavement that had been discovered in previous seasons. These new stones were

2The staff for the 2004 mapping project included Randall Younker, David Merling, Paul Ray and Robert Bates of Andrews University, Art Chadwick and Lawrence Turner of Southwestern Adventist University, Mark Ziese of Cincinnati Christian University. Also from Andrews University were Michael Younker, Matt Grey, Matthew Meyer, Ralph Hawkins, and Ron Wakeman. Kyle Jensen served as a volunteer. Reem Shqour, curator of the Madaba Archaeology Museum was the representative for the Department of Antiquities of Jordan.
photographed and mapped with the new ZMax system.

Meanwhile, Chadwick and Turner were able to replot and map all the architectural features in Fields A, B, C, D, and E (Figure 6). From these points, they were able to successfully create a three-dimensional view of these architectural features. While aerial photos of Jalul were not yet available (we have since acquired such images), photos of various features were taken from ground level and successful combined with ZMax data to create three-dimensional digital images in ARCGIS—the results were excellent, but preliminary. Further work will be undertaken to refine these images for final publication. Finally, Chadwick and Turner made a new and more accurate topographical map of Jalul (Figure 6), recording several thousand precise location data points. The results were successful and will enhance the results of the final publication.

The 2005 Season

This season, our international team consisted of approximately sixty archaeologists, students, and volunteers, and more than twenty Jordanian specialists and workers (Figure 7). The Tall Jalul Excavations continue to be

The authors of this report would like to thank all of the volunteers and staff members who participated in the project this season. Special thanks are extended to our major sponsoring institution, Andrews University. Cincinnati Christian University (through the leadership of Mark Ziese) and Northern Caribbean University (through the leadership of Paul and Helena Gregor) also participated as sponsoring institutions. We would also like to thank the Director-General of Antiquities, Fawwaz al-Kraysheh, for the support of the Department of Antiquities of Jordan provided this season. Finally, we would like to extend thanks to Patricia Bakai and Pierre Bikai along with the staff of the American Center of Oriental Research (ACOR) for their continued support and the use of their facilities while we were in the field.

The codirectors for the project this season were Randall W. Younker and David Merling. The Department of Antiquities of Jordan representatives was Mr. Bassam (from the Madaba office). Andrews University faculty and staff who participated this season included Randall Younker, David Merling, Constance Gane, Roy Gane, John McVay, Paul Ray, Jiri Moskala, Jennifer Groves, and Robert Bates.

Pottery registrars were Janet Bernal, Celeste Voigt, and Trisha Ellison. The Objects Registrar, David Merling, assisted by Paul Ray and Darrel Rohl, processed the small finds. Preliminary faunal analysis was done by Katherine Koudele (Andrews University) and Randy Younker, assisted by Edwina Rao and Dustin Hill. Christie Goulart and Michael Younker oversaw digital photography assisted by Alice and Ron Haznedel. Lawrence Turner, Justin Wood, and Michael Younker were in charge of the Geographical Positioning System (GPS)—they were assisted by Darrel Rohl, Robert Bates, and Ron Hazneld.

The excavation staff's Field Supervisors for the 2005 season included Zeljko "Paul" Gregor (Northern Caribbean University), Mark Ziese (Cincinnati Christian University), Constance Gane (Andrews University), Jennifer Groves (Andrews University), Robert Bates (La Sierra University) and Paul Ray (Andrews University). Assistant Field Supervisor for Field A was Helena Gregor. Square Supervisors included John McVay, Lazarus Castang, Teale Niemeyher, Eva Katarina Glazer, David Adams,
conducted as part of the Madaba Plains Project. For a description of the project’s long-term research objectives and previous results, we refer the reader to the preliminary reports published in earlier issues of *AUSJ*.

Excavations at Tall Jalul were conducted in six fields this season, (A, B, C, D, E, and F) (Figure 1) and uncovered remains from the Middle and Late Bronze Ages, Iron I (twelfth-eleventh centuries B.C.E.), and Iron II (tenth–ninth centuries B.C.E.) to the Late Iron II and Persian periods (c. eighth to fifth centuries B.C.E.).

*Middle Bronze Age II (1700-1550 B.C.E.)*

This season a significant amount of Middle Bronze II-III sherds were found mixed in with Late Bronze Age pottery in Late Bronze fills (Figure 8; see next section). These fills were located in Squares A3 and A4. No additional Middle Bronze II-III fills have been reached since the probe that penetrated such a fill in Square A3 in the 1999 season. The Middle Bronze II-III pottery forms and wares included white-slipped wares and Chocolate-on-White ware.


Late Bronze Age (1550-1200 B.C.E.)

Substantial Late Bronze fills were excavated in Squares A3 and A4. The fills in which the Late Bronze potsherds were found were tilted at nearly a 45-degree angle (i.e., they are running downslope toward the north side of the tell) and included some ashy lenses, indicating destruction by fire. The Late Bronze lenses conformed to the angle of the Iron I lenses above them, with no appreciable physical demarcation between the lenses apart from the pottery content and more pronounced dark ashy lenses of the Iron Age (Figure 9). Unfortunately, no architectural elements dating to the Late Bronze Age were uncovered this season, but the abundance of Late Bronze pottery in the fills points to a substantial phase of occupation during this period.

Iron I (Late Thirteenth–Eleventh Centuries B.C.E.)

Once again, excavations penetrated Iron I fills below the earliest Iron II architectural remains. In Field A, ashy lenses with Iron I sherds (collar-rimmed jars, carinated bowls, and flanged cooking pots), as well as some Early Bronze, Middle Bronze (Chocolate-on-White ware), and Late Bronze sherds (Mycenaean!) were found in small quantities in Square A3. In Square A4, these deposits were up to 2-3 m thick (Figure 9). The Iron Age fills consisted of the same fine ashy lenses seen in previous seasons. The lenses appear to represent a postoccupational phase, created in the latter part of Iron Age I, although the precise time is difficult to determine at present. Previously we have assumed that the ceramics in these ashy lenses dated to the late Iron Age I, based on the presence of, for example, collar-rimmed jars, carinated bowls, and flanged cooking pots that are typical of the period. However, closer examination of the forms now suggests that some of the collar-rimmed jars and bowls find parallels with the earliest Iron I vessels now being reported at our sister site of Tall al-'Umayri. Additionally, some bowl forms appear to resemble the so-called “Manasseh” bowls reported at Umayri, Hesban, and sites in the West Bank. If so, some of the ceramics in these ashy lenses may reflect occupational activity dating as early as the late thirteenth century B.C.E.

The Iron I lenses conform to the Late Bronze lenses below them, dipping at about a 45-degree angle to the north (i.e., they are running downslope on the north side of the tell). There is no architecture associated with the fills—our team is speculating that these fills may be outside the city wall of the Iron and Bronze Ages.

Iron II (Eighth Century B.C.E.)

In Field A, the southern portion of the western wall of an eighth-century-B.C.E. building, found originally during the 1999 Season in Square A7, was exposed in Square A9. In Field B, several additional meters of an eighth-century-B.C.E. road, which approached the gate of Jalul, were found in Square B20. It was

anticipated that parts of this road would continue into Squares B21 and B22, but the road was destroyed in antiquity and disappears in the middle of Square B20 (Figure 10). In Field C, Square 6, a small stretch of cobbled street and a wall fragment of a building from the Iron II (eighth century B.C.E.) was uncovered southeast of the later Iron II/Persian-period building found in previous seasons.

**Late Iron II (Seventh-Sixth Centuries B.C.E.)**

In Field E, a small section of mud-brick wall was uncovered in Square E2 that appears to date to the eighth-seventh centuries B.C.E. (Figure 11). An Ammonite seal was also found in this field, which appears to date to the seventh century B.C.E. The seal is made of light tan clay and divided into three registers (Figure 12). The middle register depicts a galloping pony, while the upper and bottom registers contain an inscription. While most of the letters are easy to make out and appear to be seventh-century Ammonite, a few letters are poorly preserved, making a definite reading difficult.

**Late Iron II/Persian Period (Sixth-Fifth Centuries B.C.E.)**

In Field C, the north wall of a large Late Iron II/Persian-period (fifth century B.C.E.) building was found. Most of the material from the Late Iron II/Persian period was again found in Field D, where the collapsed roof debris was removed from several rooms of the large building found in 1999. In Square D3, some figurine fragments, as well as several whole vessels (e.g., whole-mouth kraters, bowls), were recovered in situ on the floor of the southwestern most room.

**Summary and Conclusions**

While Middle and Late Bronze architecture has not yet been exposed at Jalul, the presence of fills with pottery from both of these periods points to the possibility that occupational remains from this time will be found. If so, Jalul would be yet another site that overturns Nelson Glueck’s original conclusions that Jordan was basically an empty land during the Middle and Late Bronze Ages. While not much can yet be said about this central region of Jordan during these periods, the material culture seems to conform to that of Cisjordan’s Canaanite culture. Still, the overall picture for the Middle and Late Bronze Ages does seem to point to a lower point in the level of sedentary occupation for Jordan.

That picture changes dramatically with the onset of the Iron Age. The ceramic horizons at Umayri, Hesban, and Jalul suggest that the earliest Iron Age settlements in both Cis- and Transjordan occurred in our area. The appearance of Manasseh bowls, collar-rimmed jars, and flanged cooking pots of the earliest Iron IA point to a close connection with the slightly later appearance of these forms to the west of the Jordan River. Does this support an east-to-west movement of Iron I peoples, as suggested in the biblical tradition? Do we have evidence of the Reubenites in central Jordan? The major ashy lenses of over 1 m in thickness that have been found under the early Iron II remains suggest that a major conflagration occurred toward the end of the Iron Age I.

Whether or not an archaeological case can be made for Reubenite

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occupation in the Madaba Plains region for early Iron Age I, inscriptional evidence, such as seals and ostraca, iconographic evidence, and other aspects of the material culture at Jalul, Hesban, and Umayri indicate that by the middle of the Iron Age II, the Ammonites were in firm control of the Madaba Plains Region. Indeed, during the Iron Age IIB, it would appear that Jalul was along the southern most bastion of the Ammonite cultural sphere—sites such as Khirbat al-Mudayna on the Wadi ath-Thamad, just a few kilometers to the south, show a distinctive Moabite influence, as evidenced by ceramics and inscriptions. The growing strength of the Ammonite presence is supported by the settlement pattern, which shows a consistent increase in the number of settlements from Late Bronze to Iron II, with the peak occurring toward the end of Iron Age IIB.

Finally, excavations at Jalul and the sister sites of Umayri and Hesban, along with recent regional surveys, show that after the Babylonian period—that is, during the Persian period—the land was not abandoned, but continued to be occupied. Indeed, inscriptional evidence from Umayri shows that like Judah, Ammon had been incorporated as a province into the Persian administrative system.

Future seasons of work at Jalul will not only help expand our knowledge about what is already known about the site, but will also penetrate the earliest chapters of its long history in the Madaba Plains Region.
Figure 1. Aerial photo of Jalul showing the location of the excavation fields.

Figure 2. The 2000 Jalul team that opened Field E.
Figure 3. Ramesside seal found in Field E.

Figure 4. Art Chadwick operating the "rover" for the Z-Max system at Tall Jalul.
Figure 5. The 2004 Survey Team at Tall Jalul.

Figure 6. The topographic map created by Z-Max—it is superimposed on top of an aerial photo of Jalul through the use of special GPS software.
Figure 7. The main group of the 2005 Jalul excavation team.

Figure 8. Typical Middle Bronze and Late Bronze Age sherds—white-slipped ware and Chocolate-on-White wares were found in the fills.
Figure 9. Iron and Late Bronze Age fills in Square A4 of Field A.

Figure 10. Iron Age II (eighth century B.C.E.) approach ramp in Field B.
Figure 11. Section of mud-brick wall found in Square 2 of Field E.

Figure 12. An Iron Age II (probably seventh century B.C.E.) Ammonite seal found in Field E.