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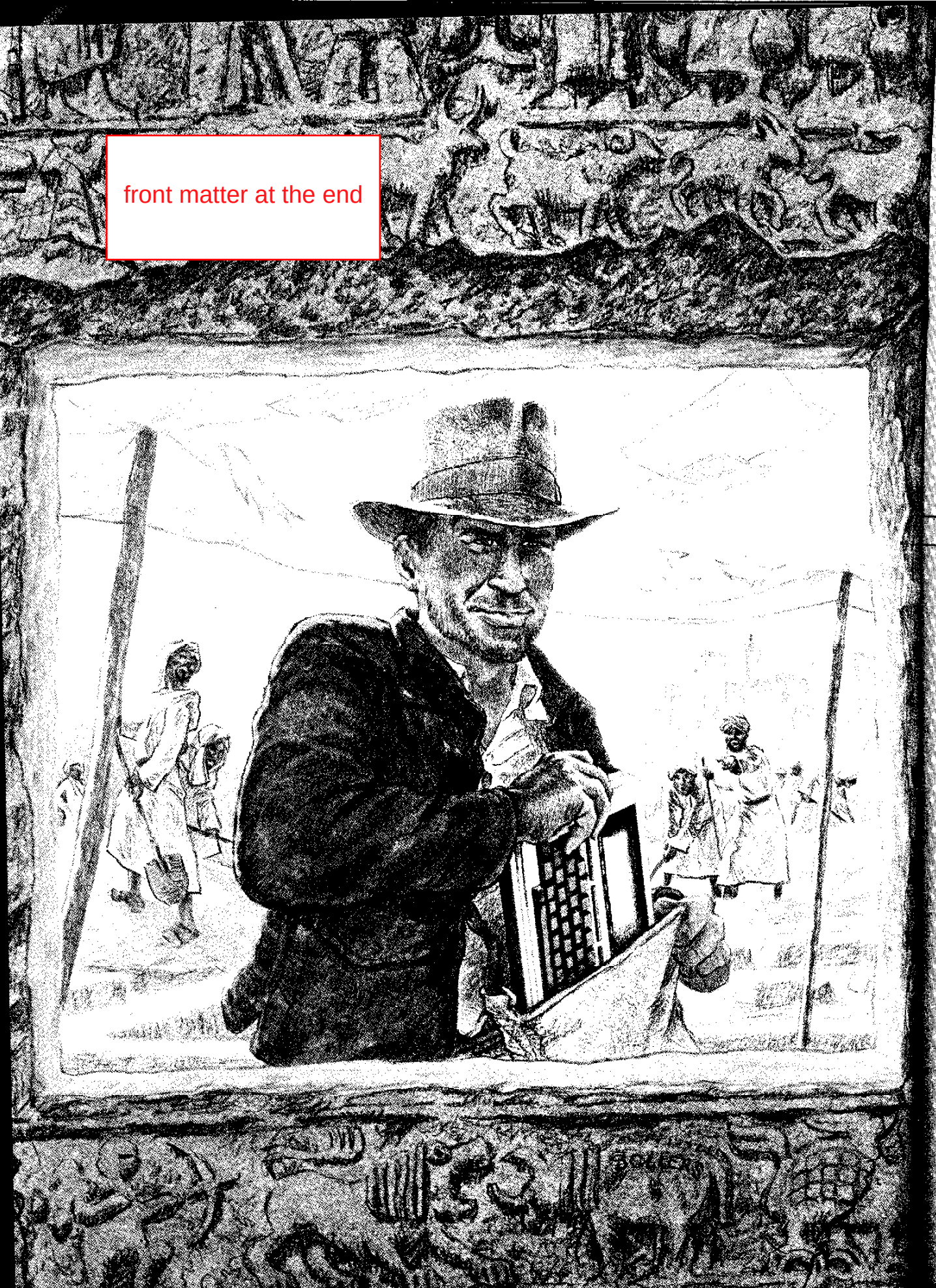


ARCHAEOLOGISTS TRADE FEDORA AND LEATHER FOR 100

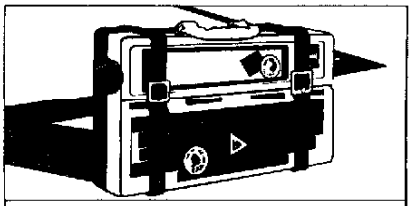
The romantic days of searching for an ancient city with a shovel and bullwhip are gone. Now the searching's done with a shovel and microcomputer.

by DANIELA BUIA QUINN

Going on an archaeological dig is an exciting prospect — all the more so when the investigative site is thousands of miles from home in a totally different part of the world. One thing you certainly don't expect to find in the middle of the Syrian desert are lap-sized computers.

The Joint American Expedition to Terqa was to dig for eight weeks at a 5000-year-old site on the banks of the Euphrates River in eastern Syria. Headed by Professor Giorgio Buccellati of the University of California at Los Angeles and Professor Marilyn Kelly-Buccellati of California State University at Los Angeles, the team consisted of professional staff archaeologists and included a number of graduate students, like myself, from the history and archaeology departments specializing in the Ancient Near East.

Excavating in the Syrian desert on an archaeological dig isn't exactly like digging up weeds in your backyard on a Sunday afternoon. And despite the jokes among friends about "Indiana" Louise or "Indiana" Mark, 99 percent of archaeological work today requires painstaking digging and concentration and most important of all, detailed documentary recording of information. The romantic days of searching for an ancient city with just a shovel and a bullwhip are long gone. All of us recognized that!



TRAVEL

TANDY IN DAMASCUS. We knew the 100 was going to be an important component in our daily schedule. We'd spent the better part of three months learning a coding system devised for the types of elements and artifacts an excavation might produce. Ranging from the largest architectural complex to the smallest bead, Dr. Buccellati and his associates had worked up a series of recording forms to make sure all pertinent information on each item was properly collected.

Landing in Damascus after a long flight with what seemed like 700 pounds of luggage should have been exhausting, but our adrenaline was booming. We got to our hotel in the old quarter of the city and were greeted by the sounds of midnight prayers being chanted from the city's oldest Islamic mosque.

In the morning, after a sleepless few hours, we had time for a little sightseeing before taking the cross-country bus ride to Terqa. On the way to the National Museum, with its priceless collection of artifacts we'd spent years studying in books, we came right up against a Radio Shack store! No wonder the 100 had been selected. Not only was it small, compact, and portable, but if anything went wrong, we always could get help from the Tandy store in Damascus.

MODEL 100 IN THE TELL. We had our first look at Terqa on a wonderful sunny May morning. The river meandered right past the bottom of the site (called a tell). A quick tour of the housing compound gave us a clear indication of priorities. Our rooms were in mud-brick houses, clean but definitely spartan in amenities. The "computer" room, however, had *two* fans and strict instructions about keeping it as clean and orderly as possible. Instructions, which I might add, weren't too easy to keep.

The 100 (with 32K), the flatbed multi-color plotter (Model FP 215) and the standard cassette recorder were all set up in this room, along with two hanging light bulbs, electrical transformers, and a power stabilizer.

Our home was in Ashara, a town situated on about half of the ancient city. The city receives its electricity from the Tabqa Dam project upriver. But in periods of peak use, the national system cuts off and the trusty local gen-

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erator takes over, sometimes reluctantly. At least twice a day this changeover happened, so we learned to be careful when on the computer and became *very* definite about making backup copies of everything.

The city of Terqa dates back to 3000 B.C., but this year we'd be digging on a level of the city belonging to the Old Babylonian period, about 1700 B.C. Unlike Egypt, the citizens of our city didn't have stone to build with, and used sun-dried mud bricks to construct their homes, temples, and administrative buildings. Pavements were of beaten earth, sometimes coated with a thin layer of plaster. It was like learning to find mud in mud . . . and backwards to boot!

EXHILARATING EXHAUSTION. The daily routine of our excavation ran something like this:

Up at 5 a.m., brush teeth in the sink in the courtyard, and get to breakfast before it was all gone. Breakfast consisted of hot cerial, Syrian bread, fresh yogurt, hardboiled eggs, and hot tea.

Onward to the site and ready to dig at 6 a.m. Dig until 10 a.m.

Twenty-minute "faidos" break when we stretched our aching backs and broken knees and wolfed down a second breakfast of more eggs, bread, fruit, and tea.

Back to work under the Syrian sun (120 degrees in the shade was the norm) until 2 p.m.

Dinner, the main meal of the day was not until 2:30 p.m.; just enough time to take a cold shower or at least get some of the dirt off.

After dinner, clean and sharpen tools, begin writing up the daily journal and rewrite notes. Lectures from the staff and visiting archaeologists scheduled about 5 p.m. (when it starts to cool off) on methodology, technique, or analysis.

A light supper of soup, fruit, desserts, and tea about 7 p.m., and then back to record-keeping and finally sleep.

Fifteen- to 16-hour days, six days a week, with Fridays off for sightseeing, catching up, or resting.

But don't be fooled by either the pace, hours, dirt, or heat — we loved every minute of it! We first-time mudpuppies were finally doing what we'd trained to do: We were on our first excavation. The pace made us feel productive as well as exhausted. By the time the season was over, some of us didn't want to leave!

Nevertheless, we got the picture early. For every hour of excavating on the tell, there'd be from one to two hours of documentation upkeep. There was no doubt as to the usefulness of having computers in the field. The gross amount of data about a site we uncover is quite a lot, and its recording takes on two distinct forms.

STRATIGRAPHY. The first and primary concern is Stratigraphy. That means the order (deposition) and way (emplacement) things came to be buried in the ground, viewed in layers.

But people never lived in horizontal layers like a cake, and walls are vertical and so are drains, not to mention the lovely rodent holes that run through every layer of a site and stir the dirt up.

As you dig, too, you remove what's above to see what's below, so double-checking a sequence becomes impossible. The moment of noticing the differ-

ences in soil texture, compaction, or color signaling the appearance of two "somethings" is the key stratigraphic moment, and that's the moment that has to be carefully documented.

Our stratigraphic recording approach is the converse of an architect's. We both deal with the needs of an individual or a society and the solutions to the organization of space; we just approach the problem differently. The architect knows the needs of a living client and designs a solution to fit those needs. An archeologist can see only the results and has to discover the original needs of an ancient civilization.

TYPOLOGY. The second type of information we record is Typological, those characteristics of an object making it similar or different from another object of the same general class. That information tells the quantity and distribution of a specific type of object over a geographical area and through a period of time. The differences or similarities traced sometimes give indications of what the object was used for (function) and whether or not that class or type of object had some special significance in a given cultural context, either for an individual or society.

All of this information has to be accurately recorded in a file — on the spot — especially the stratigraphic information. In many instances, it's the only thing brought back for further analysis, since the architecture stays in the ground or is destroyed when excavated and the objects belong to the country's heritage so cannot be exported.

Along with this mass of data, graphics also are essential. Photographs are taken from every conceivable angle to document each step of the excavation. Daily floorplans and sketches are even more important since they're based directly on the digital information.

SYSTEMATIC UNITS. An archaeological site is divided into systematic and workable size units. In our case, the units were 10 meters square. As an item was uncovered, its location had to be measured from three control points, two horizontal and one vertical. From these the item's absolute position in space was calculated by using standard surveying techniques. For each item, then, we had at least three measurements or ties and each set of three was a relay point.

For complex elements like walls we had more than three ties. This was because walls are hardly ever straight and have been often reused, patched, reinforced, and rebuilt through the centuries. Each modification to the core structure had to be identified separately. All the relays were maintained in our volumetric logs and added to the stratigraphic and typological information gathered.

Daily drawings were done of the elements we had found, and each drawing became more complex than the one done the day before. But each person draws differently, so errors crept in, and with errors, major distortions from the numerical data. It became imperative the drawings be consistent and precise for each unit. The features of one excavation unit had to link properly with the features of the adjacent unit. And as more information was obtained, a clearer picture of the layout of the building or city was possible by plotting all the units together.

PLOT PARTNER. Since each unit was dug at a different place, depending on the complexity of the items found in any one square, an area floorplan couldn't be plotted each day. Only a unit floorplan could be constructed from the digitized relays. A simple but precise way of translating the long sets of volumetric log relays (the digital data) into graphic representations reflecting the true volumetric and three-dimensional character of each stratigraphic level was needed.

So, each one of us became attached to the 100 as an essential partner in the recording system. Each day, (after scrambling to see who'd get the 100 first) we entered our journals, indices, and records, creating standard text files per excavation unit.

In these we'd write our step-by-step records of where and what was uncovered that day, why we decided to focus on some area of the unit and what our theories were regarding the elements found. In a separate text file, the coordinates derived from the ties and relays taken for each structure or artifact were entered.

AFPP.● An Archaeological Field Plotting Program (AFPP) was developed in Basic. (The program, "Architectural Floor Plans, Digital Plotting", was published and copyrighted by Giorgio Buc-

cellati and Oliver Rouault in their article *Terqa Preliminary Reports No. 12: Digital Plotting of Archaelogical Floor Plans*, Undena Publications, P.O. Box 97, Malibu, CA 90265.)

By adding move and draw commands to the sets of coordinates, the AFPP drives the plotter and graphically draws a representation of each unit each day. Errors show up quickly, so math can be easily doublechecked or measurements retaken the same day.

The text files change, of course, as the complexity of the combinations of walls, floors, burials, pits, and objects in the units become more numerous. But with the AFPP, it's easier to determine which of those elements and combinations belongs together functionally or for a given period of time.

The features from the previous day are drawn in one color and the finds of the current day in another. The floorplans are never static; elements change, enlarge, and are recombined as more information is added to the files. The use of the 100 and the plotter takes on the dimensions of an adventure itself, as the pictures produced clarify what's being found in the dirt.

INVALUABLE TOOL. Eventually, enough information and data is gathered to sort the elements by strata, linking up units and the items in them to the same chronological periods. So far, 10 such separate strata have been defined, and the plotting within each has become very specific.

By manipulating the text files, we can draw, in any given unit, the features we want and know the result is an accurate representation of spatial realities. For instance, we can plot all the Medieval burials and see exactly how they interface with the Old Babylonian walls beneath. Or, we can plot the distribution of artifacts on the floors to notice functional centers of use or production in a given period.

The ability to do this type of plotting in the field is inestimable. It not only documents, but the results of the data sorts become part of the informational base from which the excavators make their decisions for the work plan of the following day.

As graduate students, the entire experience at Terqa was exciting, but the application of microcomputer workstations in the field was extraordinary. What had seemed like impossible masses of data needing to be noticed and recorded became manageable.

UNDAUNTED. Our attentions were focused and became increasingly precise. Our observation of details during the excavation process improved and could be verified and corrected easily. With just a little practice, we learned to manipulate the data so the analysis of the material became clearer and the stratigraphic relationships understandable. We could spot where we needed more information, where the sequences were still unclear, and work on those areas the next day.

The season at Terqa had been an experiment using the 100 in the field. Despite the dust, high heat, spiders and scorpions, and grimy hands of inexperienced graduate students who used it for hours upon end, the equipment worked beautifully.

Work on the data base continues now that we're back at the Univeristy. The AFPP is serving as the starting point for a whole realm of new approaches to computer processing in Near Eastern archaeology.

A brand-new journal has been inaugurated, appropriately called, *Computer Aided Research in Near Eastern Studies* (CARNES), published by Undena Publications, Malibu, CA, which featured the AFPP program in its premiere issue.

Further, the program is undergoing some refinements and we're reworking the encoding manual to make all of the data collection formats consistant within the overall computerized system.

FUTURE HISTORY TOOL. All of us are becoming more comfortable with the equipment. Most have begun to think of microcomputers as essential parts of our field kits, along with our digging trowels and brushes. A fair number have purchased their own home computers and have begun exploring additional applications in archaeological research, including dissertation projects.

Microcomputers and ancient Terqa are aspects of two civilizations spanning 5000 years. Today's technology is helping to discover the secrets of yesterday and both combine to enhance tomorrow. Bringing the two worlds together may no longer seem so unusual in the face of today's high-powered research setting, but their combined impact in the field of archaeology is definitely going to be spectacular! ◀

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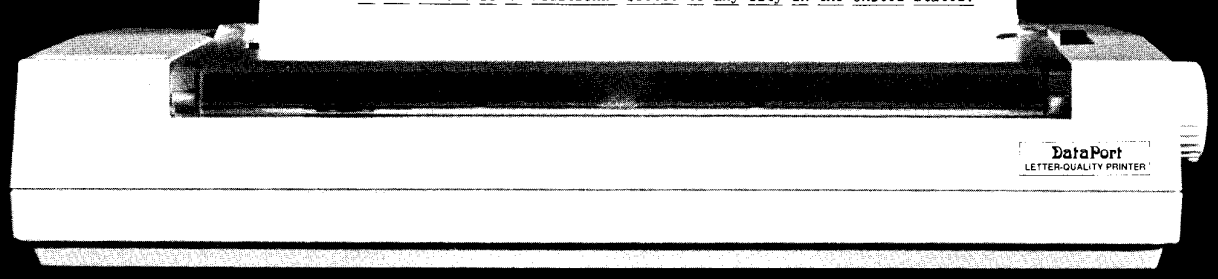

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