Life and Death at the Peştera cu Oase

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Life and Death at the Peştera cu Oase

Part One

Introduction and Background

3

Problems, Approaches, and Fieldwork: 2004–2005

João Zilhão, Ştefan Milota, Ricardo Rodrigo, Silviu Constantin, and Erik Trinkaus

Introduction

The 2002–2003 discovery in the Peştera cu Oase galleries of the mandible and face of two early modern humans (Chapter 2) raised a series of questions requiring an archeological approach: Did additional remains of those individuals exist? Did the cave also contain a material or behavioral context (e.g., artifacts or features) that could be associated with the fossil finds? Did such finds document evidence of human activity inside the cave (e.g., resulting from intentional burial, body disposal, accidental death), or had they been brought in from the outside by natural processes (e.g., sheet-wash, flooding, carnivores)? Were the human bones contemporary with the abundant cave bear remains among which they were found? What site formation and taphonomic processes explained the spatial distribution of the different categories of osteological remains (of ursids, canids, caprines, cervids, and humans) observed on the surface of the galleries? To answer these questions, two archeological field seasons (July 2004 and July 2005) were carried out in the Peştera cu Oase. Here, we explain our approach and discuss the criteria underlying the research strategy eventually adopted.

Preliminary Reconnaissance

The first step of the work consisted of an assessment of the site and finds from a speleoarcheological perspective, based on the experience accumulated since 1989 by Zilhão and Rodrigo in the study of the Almonda karstic system, in Portugal, which had presented a set of similar problems (Zilhão et al., 1991, 1993). To that effect, a reconnaissance of the Oase galleries was carried out on July 4, 2004, building on a preliminary map of the cave prepared by Milota and Rodrigo during 2003 and after the Pro Acva Grup had completed all the preparation work that needed to be carried out on the access route. At the end of the day, the following relevant observations for decision-making had been entered into the season's field book:

1. Cave bear nests (Figure 3.1) were concentrated in the Galeria Culcuşurilor and adjacent areas of the Sala Mandibulei, with a single, isolated instance in the Galeria Lungă, indicating that these were the parts of the Oase system farther from the entrances originally used by the bears and where they had hibernated and sometimes died.
2. The communication between the Sala Mandibulei and the Galeria Culcuşurilor was effected through a markedly sloping narrow passage (the Panta Strămoşilor) featuring abundant osteological remains in derived position, including the Oase 2 human face and associated cranial material, recovered toward the lower end of that slope (Figures 3.2 and 3.3).
3. Since a rocky ledge (formed by outcropping blocks or areas of raised bedrock) separated the Sala Mandibulei from the Galeria celor Trei Cranii, the latter could be excluded as a likely source for the evidently displaced surficial material recovered in the former and in the Panta Strămoşilor.
4. When found in 2002, the Oase 1 mandible was sitting directly on top of a calcite crust but not cemented to it. In the vicinity of its original location, some bones, all bear, were observed in a similar position, while other bones were encrusted in the calcite. This area is immediately adjacent to, and in

Figure 3.1 The Galeria Culcuşurilor. Top: the mass of bones piled against the Poarta passage, from which Petrea is seen coming out. Middle: the middle part of the passage at the beginning of the 2004 field season, with a view toward the excavation at the base of the Panta Strămoşilor. Bottom: bear nest number 5.

continuity with an also calcite-covered slope leading to the Galeria celor Trei Cranii (Figure 3.4). Close to the bottom of this slope, bone fragments with no adhering calcite and whose preservation condition was similar to that of the Oase 1 mandible could be observed inside a burrow excavated through the crust into the underlying loose sediments. These observations suggested that the human mandible and the bear bones sitting on top of the calcite probably corresponded to material that was originally

Figure 3.2 Grid rows 33–36 of the Panta Strămoşilor in 2004, prior to excavation. The passage to the Sala Mandibulei is behind Gherase, who is seen squatting on row 37, 7 meters downslope from the findspot of the Oase 1 mandible.

Figure 3.3 Sala Mandibulei: the calcite-covered slope at the base of which the Oase 1 mandible was found in 2002 (see Figure 2.4), and the passage to the Panta Strămoşilor (marked by the caver's helmet on the floor behind the short stalagmite).

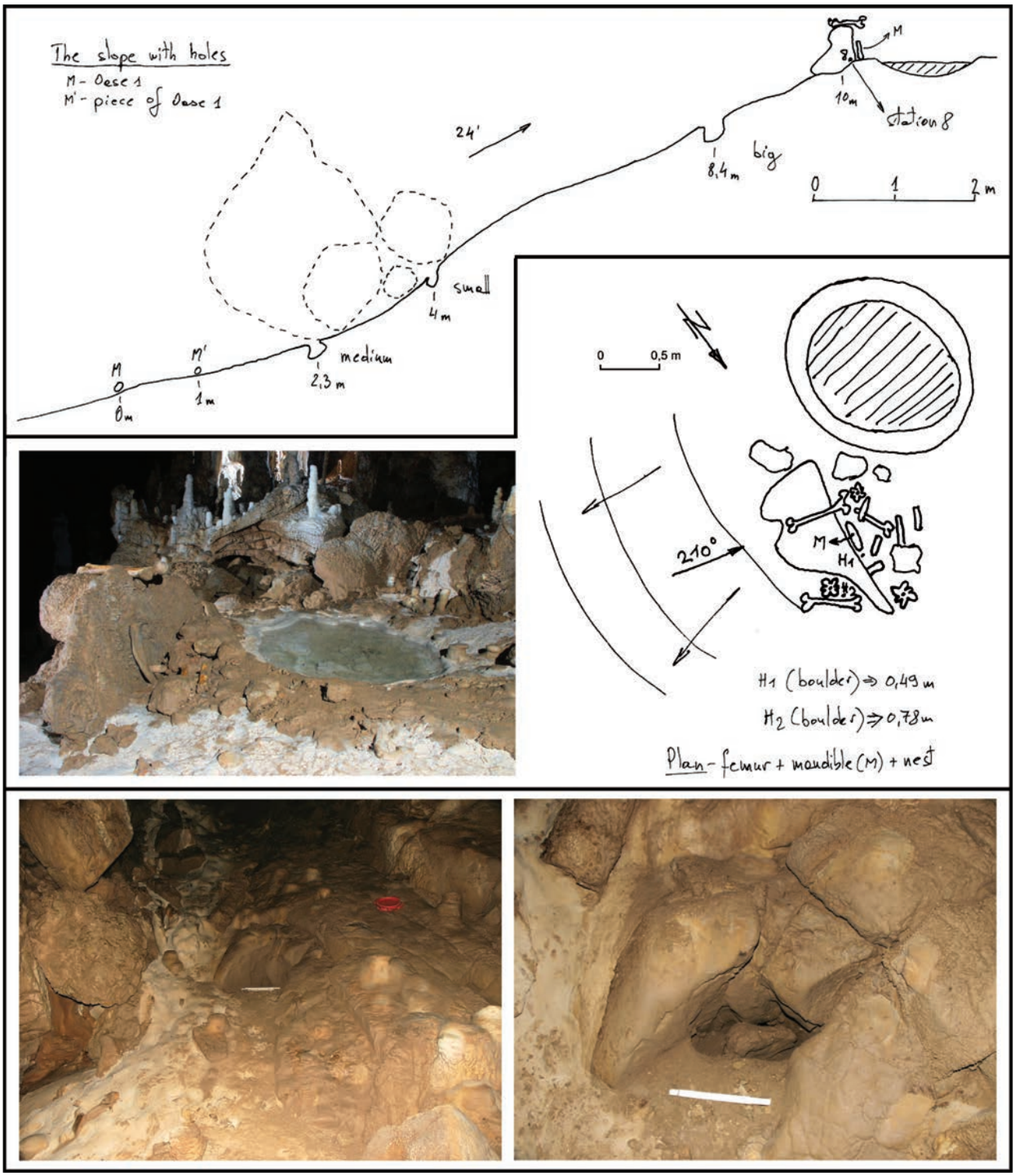

Figure 3.4 The slope leading from the Oase 1 findspot to the Galeria celor Trei Cranii. Top: topographic profile with indication of the main burrows. Middle: the "femur-on-the-rock" and the adjacent depression (possibly a bear nest). Bottom: the burrow halfway up the slope; the nature of the deposit (a variably cemented open work accumulation of blocks and large boulders) can be appreciated in the right-hand close-up view.

subsurface and brought out by recent burrowing activity.

5. Additional evidence that small carnivores used or lived in (and died) in the Oase galleries includes two aspects. The first are the *moving foxes*, a set of nonfossilized fox mandibles observed on the floor of the Galeria celor Trei Cranii (Figure 3.5) and whose position changed at different points in time between 2002 and 2005, thereby indicating continued displacement by animal activity in between the periods of the project's brief incursions. The second is an articulated skeleton, still partly covered with soft tissues, of a weasel-size carnivore found in the galleries leading to the Poarta.
6. Aside from the human bones, all of the remains of noncave dwelling species that could be observed on the surface were of ibex, including the two mandibles in the immediate vicinity of the Oase 2 find spot and several skulls in the Sala Mandibulei (Figure 3.6). In the latter place, a young caprid skull was closely associated with two maxillary fragments, which had probably broken off it, a scatter pattern similar to that of the Oase 2 pieces further downslope. The coincidence in spatial distribution indicated that skeletons (or at least complete skulls) of both human and ibex had been introduced in the cave and then broken and slightly scattered through similar processes and by the same agents.
7. Sediment subsidence close to the collapse separating the Galeria Lungă from the outside (Figure 3.7) enabled subsurface observation of the fill over a thickness of > 50 cm, but no bones were observed inside these deposits. The large number of huge boulders accumulated here meant that reopening the gallery would represent a major engineering

Figure 3.5 The Galeria celor Trei Cranii. Top: view toward the exterior, blocked by sediment building up against the roof of the gallery. Bottom: modern bones observed on the surface of this gallery (left, the *moving foxes*; right, metapodial of a domestic goat directly dated to 129 ± 25 ^{14}C BP).

Figure 3.6 A pair of ibex horns with stalagmite overgrowth found on the surface of the Sala Mandibulei near the passage to the Panta Strămoşilor.

Figure 3.7 The end of the Galeria Lungă. Note the blocking of the communication with the exterior by a huge collapse covered by flowstone.

project in addition to posing a major security risk for the integrity of the site.

8. In contrast, the blocking of the Galeria celor Trei Cranii's exit presented a less daunting reopening challenge since, when viewed from the inside, it apparently resulted mostly from sediment building up from the exterior against the roof of the gallery (Figure 3.5).
9. In 2002, at the inner end of the Galeria celor Trei Cranii, close to the slope leading to the find spot of the Oase 1 mandible, the Pro Acva Grup team observed a bear femur sitting on a rock, some 60 cm

above the floor, initially taken as suggestive of some level of human involvement in the accumulation of the deposits (Trinkaus et al., 2003a, 2003b). Adjacent to that rock, however, a clear depression was observed, in and around which there were numerous other bear bones, some of which were in no less "strange" attitudes (e.g., a bear mandible was leaning vertically against one of the rock's sides) (Figure 3.4). A parsimonious explanation for these apparently nonnatural dispositions is that the depression may have been used for nesting (although we did not count it as a nest because it was covered with calcite and therefore could not ascertain whether it had formed as a result of geological processes or bear activity). The "femur-on-the-rock" may thus have been unintentionally raised by a bear's rotational movements in the nest. The reason it remained in such an elevated position may well be that the rock has a tabular superior surface and water dripping from the roof quickly cemented the bone to that surface, preserving the "arrangement" from further disturbance (e.g., by occasional flooding or the activity of small mammals).

10. Neither during this reconnaissance, nor before (in 2002–2003), nor after (in the framework of 2004–2005 sample collection excursions conducted beyond the area eventually selected for excavation), were there any archeological indicators of human activity (e.g., accidental black staining of the walls by lighting, remains of burned-out torches, hearths, features, handprints or footprints, artifacts) observed anywhere in the Oase system.

These observations suggested that (1) the Oase galleries were a purely paleontological site; (2) the presence of human remains was a by-product of natural processes; and (3) the key to sorting out the site formation, taphonomy, and dating issues raised by those remains was to be found in the Sala Mandibulei and the adjacent Panta Strămoşilor. Moreover, in terms of natural history, the extensive, pristine cave bear dwelling surfaces represented a major heritage value. The need to preserve these surfaces thus had to be duly considered when determining the extent to which it was acceptable to bring into the site the level of disturbance and destruction (albeit controlled) that any archeological investigation inevitably entails.

Another factor to bear in mind was that humans were a marginal component of the mammal bone accumulation and that the volume of subsurface deposits in the Sala Mandibulei, from where the Oase 1 mandible and the Oase 2 face conceivably derived, was in the order of the tens of thousands of cubic meters. Defining as the project's goal the recuperation of the remainder of these individuals' skeletons, or of additional ones, implied deeming as appropriate the sacrifice of the cave bear surfaces and features and, given the dimensions of the enterprise, would be impossible without reopening one of the blocked original entrances or a new artificial one. Either option, however, would by the same token eliminate the one protection that had secured the preservation of the site for scientific investigation, namely, the difficulty of access, and expose it to intentional or unintentional destruction by fossil hunters and careless visitors pushed by curiosity.

In short, considerations of efficacy (i.e., defining goals that were realistic within the project's time horizon and given the concrete situation on the ground) and conservation (i.e., obtaining as much information as possible while at the same time causing the least possible disturbance of the pristine underground environment) dictated the twin decisions that structured our research strategy:

1. All research at the site would be carried out using the speleodiving access path (i.e., via the spring, passing the siphon, up the Puţul, and through the Poarta; Figure 3.8), which set limitations to the amount of excavation that was possible, given the technical difficulty of the route, the bulky nature of the finds that would have to be taken out (as we quickly found out, a single cave bear humerus can be as long as an entire human arm) and the need to sieve the sediments (Figure 3.9).
2. All excavation work would be restricted to the Panta Strămoşilor, where the Oase 2 face had been found, where there was a strong probability that additional fragments of the corresponding skull remained, and where postdepositional disturbance by clearly geological processes had already modified any arrangements left behind by cave bear uses of that passage.

Consequently, after the preliminary reconnaissance of July 4, 2004, and throughout the two seasons of subsequent work, conservation concerns dictated a self-imposed "prohibition" of access to the Sala Mandibulei, the Galeria Lungă, and the Galeria celor Trei Cranii, except when needed for mapping, image recording, sample collection, and in situ gamma-radiation measurement (for electron spin resonance [ESR] dating).

Research Strategy

Considering what has been outlined above, the following list of tasks for the 2004–2005 field seasons was outlined:

1. To record and map (topographically, videographically, and photographically) the features on the

Figure 3.8 The access route. Top left: Sarcinã negotiates the torrent on the way to the siphon. Top right, clockwise: Zilhão going through the semi-sump; Rodrigo transporting a cargo of bones loaded onto a clothes hamper prepared to that effect; Zilhão diving through the siphon; Rougier gearing up for the dive; Zilhão diving through the siphon. Middle left: Gherase coming out of the dive. Middle right: Horoi sampling in the Puţul. Bottom left: Petrea climbing the Puţul ladder. Bottom middle: Gherase in the Galeria Gururilor, between the Puţul and the Poarta. Bottom right: Zilhão going through the Poarta.

Figure 3.9 Sieving in the river (with Sarcină, Gherase and Milota).

cave floor (namely, the cave bear nests) and their surroundings.

2. In the Sala Mandibulei, the Galeria Lungă, and the Galeria celor Trei Cranii, to conduct in situ identification and measurement of the bones, when needed, with no removal except when absolutely necessary (e.g., to sample for dating).
3. To undertake limited excavation, after recording of the surface material, in the Panta Strămoşilor, between stations 7a and 7 of the 2003 topography. By limited excavation it was meant (quoting from the July 4 entry of the 2004 field book): "mapping, recording and removal of bones on the surface, at the base of the slope, until a stable surface from which people can stand and work without destroying the bones lying there is obtained; at that point, excavation will advance upslope, using the same strategy, perhaps leaving behind stepped surfaces, until the area where Oase 2 [was] found is attained; here, if necessary, it will then be possible to excavate down to the level of the stable surface established at the base of the slope, i.e., in a thickness of some 40–50 cm, which should be enough to recover further remains [from that individual]."
4. To conduct a speleological and geological study of the entire karstic system and of the Quaternary deposits exposed at different points in the speleodiving route, including extensive speleothem sampling for dating and paleoclimate reconstruction.
5. To locate from the outside the original entrances to the system (i.e., the blocked exits of the Galeria Lungă and the Galeria celor Trei Cranii as well as any possible connections of the Sala Mandibulei with the exterior) to see how they related to features of the exokarst (e.g., sinkholes) and to gain a better understanding of the overall dynamics of the system.

Additionally, it was decided to search for the archeological context of the human fossils lacking in the Oase

passages in a large nearby cave belonging to the same karst network, the Peştera La Hoţu (a.k.a. Peştera Hoţilor; Figure 3.10). This site had been identified as a promising location for prehistoric settlement during a March 2004 visit by Moldovan, Trinkaus, and Zilhão. After mapping by Rodrigo and Zilhão on July 5–6, 2004, an area for testing was selected, and archeological excavation began, undertaken by Bălțean, Cincă, and Petrescu. Eventually, significant levels dating to the Bronze Age, the Early Neolithic, and the Late Mesolithic as well as traces of Tardiglacial human uses of the site were uncovered, but Marine Isotope Stage (MIS) 3 deposits do not exist or have yet to be reached (Bălțean and Cincă, 2004; van Leeuwaarden and Queiroz, 2005; Bălțean and Petrescu, 2007; Bălțean et al., 2008).

The locations of the original entrances to the Peştera cu Oase on the current plateau surface were determined on the last day, July 27, of the 2004 field season. We used a SLOTER device, a transmitter/receiver system working on very low-frequency electromagnetic wave lengths that had been proven successful, under similar conditions, in the Almonda karstic system of Portugal (Carvalho and Veiga, 1989; Zilhão et al., 1991, 1993). The receiver was operated outside by Rodrigo, who could pick up clearly the signal of the transmitter, operated inside by Gherase, who successively turned it on at the different spots of the

Figure 3.10 Peştera La Hoţu. Clockwise from top left: exterior view of the entrance; interior view of the porch area in March 2004 (note the ice stalagmites); the cave seen from the bottom end; Zilhão, Cincă, and Bălțean (left to right) squatting in the area selected for opening of the initial test trench.

Oase system previously identified inside as possibly having been anciently opened to the exterior: at the ends of the Galeria Lungă (found to be ~15 m below ground surface) and the Galeria celor Trei Cranii (found to be ~6 m below ground surface), and adjacent to the stalagmite curtain forming the north wall of the Sala Mandibulei (where the findspot of the Oase 1 mandible was found to be ~30 m below ground surface).

The exterior locations identified broadly corresponded to those inferred on the basis of a compass-and-clinometer map of the overall system that had been drafted by Milota and indicated that the underground Oase passages once opened onto different points that were all located alongside the edges of the largest sinkhole of this small limestone massif. To obtain a tool bridging the below- and above-ground landscapes relevant to the geological, geomorphological, speleological, and archeological interpretation of the massif, the project then ordered a detailed topographic map of the area, which was drafted in the winter of 2005–2006 by Bogdan Badescu, of the Asociatia Speologica "Exploratorii" de Reşiţa, with the collaboration of the Pro Acva Grup (Figure 5.1).

Excavation Methodology

A 1 m² grid system using topographic station 7a as the starting point and the line joining stations 7a and 7 as the grid's main axis was set up in the Panta Strămoşilor (Figure 3.11). Since the distance between the Poarta and station 7a was about 30 m, the beginning of the number sequence for the squares in the gridded area was set at 31, increasing toward station 7. Along the width of the gallery, squares were designated with letters, from right to left (looking upslope), with the 7a–7 segment of the topography's polygonal line marking the separation between columns M and N. Zero-level (datum) points were marked on the wall, on both sides, with the help of a laser level, used throughout for the definition of horizontal planes.

The different squares were further subdivided into 0.25 m² excavation units (A, B, C, and D) for a finer positioning of small finds and sieve material. Examination of the surface indicated that the surficial bone bed in the Panta Strămoşilor was a jumble of densely intertwined material generated by geological processes in the framework of a single event or within a very short time span (which the excavation eventually confirmed; see Chapter 10). Moreover, it was inferred that the entire (but reduced) thickness of the jumble should be treated as a single plane of accumulation, given this formation process and the large size of many of its components (e.g., bear ribs, which are long and curved could have one end at the bottom of the jumble and the other exposed on the surface, as was subsequently observed during excavation). Therefore, elevations were taken only for the top and the base of the bone bed, not for the individual items recovered therein. Complete bones and larger bone fragments (> 20 cm long), however, were individually plotted, either by drawing on millimeter graph paper or via labeling on printouts of photos of the excavation areas orthorectified with Photomodeler© software (Eos Systems, 2004) (Figures 3.12 and 3.13).

The excavation proceeded upslope from row 32, leaving column M of the grid as a witness block. The bone bed, designated Level 1, was completely removed in columns N and O, between the witness block and the left wall of the gallery, and in rows 32 to 36, plus quadrants C–D of row 37, up to nest 9, which was left intact (Figure 3.11). As a rule, the underlying Level 2 was excavated over a very reduced thickness (< 10 cm) and only inasmuch as necessary to (1) allow for the retrieval of material from Level 1 sitting directly atop its surface (e.g., long bones whose bottom ends slightly penetrated it) or (2) recuperate Level 2 bones protruding from the surface of the deposit and that, if not removed, risked damage or destruction by subsequent archeological excavation in adjacent squares. Exceptions to this rule were:

- Square N32, the first to be excavated, where the bone jumble was very thin and, for stratigraphic recognition purposes, the dig was taken to a depth of 20 cm below the surface.
- Squares N33C–D and O33D, taken down to the same elevation as N32 to obtain a stable platform to facilitate the continuation of the work toward the upslope units (although, in O33D, the volume involved was rather limited because, at these elevations, square O33 was occupied by an erosional feature whose formation implied almost total loss of the Level 2 deposits that once existed here).
- Squares O34B–D, where Level 2 was excavated down to some 55 cm below surface to obtain deeply buried tooth samples for ESR dating.
- Squares N35B and N36B, in an area of the Panta where, closer to the right-hand wall, Level 2 was exposed on the surface, Level 1 filled a shallow gully against the left wall, and, given the overall slope, the excavation, therefore penetrated deeper into Level 2 in the B quadrants to obtain stepped surfaces to facilitate further work upslope.
- Squares N37C–D, where the excavation was taken to some 90 cm below the surface to produce a profile for stratigraphic reference.

The elevations reached in the different units are given in Figure 3.11.

In 2004, the excavated sediment was bagged and transported to the outside for wet sieving by Codrea and Moldovan, under good lighting and with a fine 0.5 mm

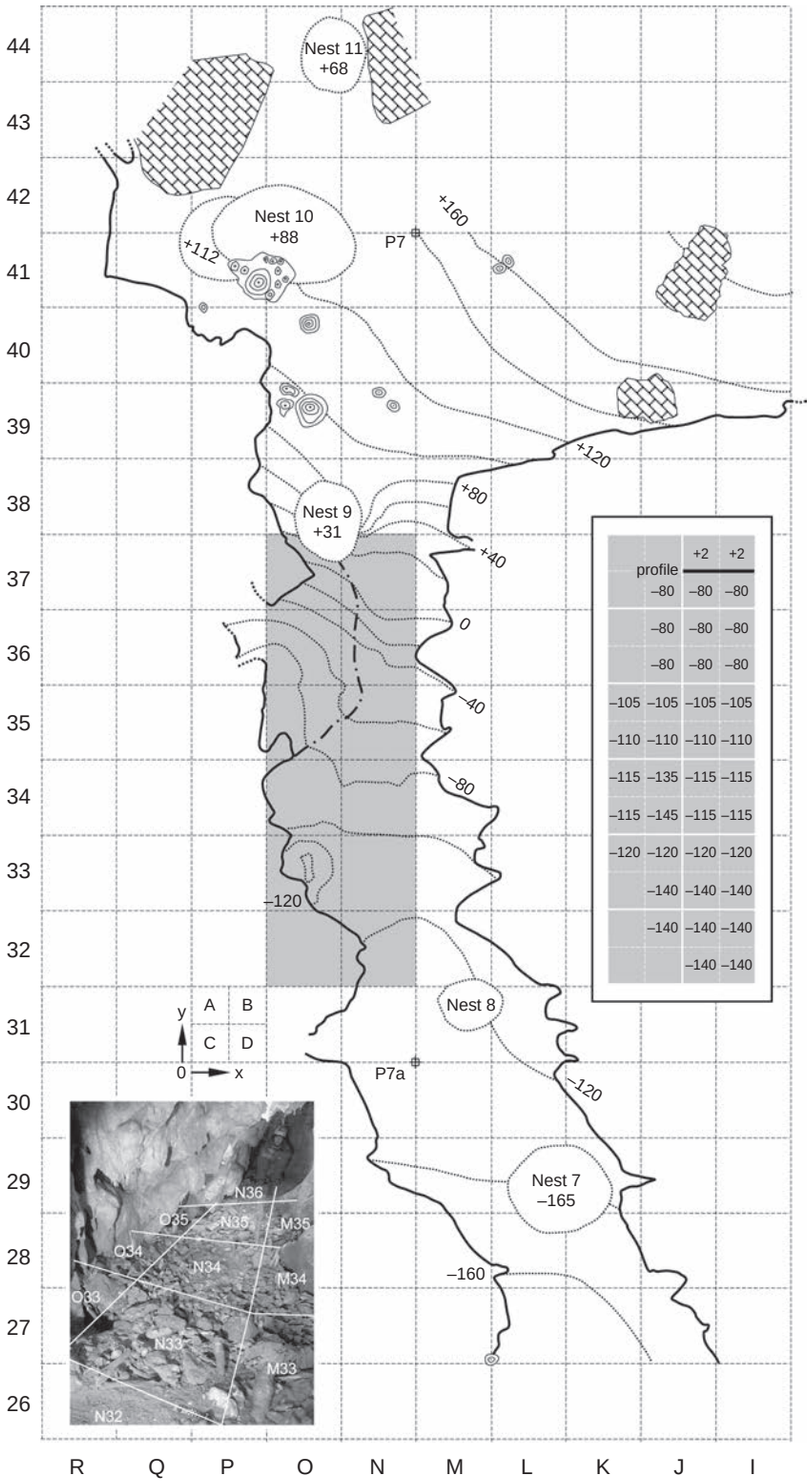

Figure 3.11 Topography of the surface of the deposits in the Panta Strămoşilor and adjacent areas of the Sala Mandibulei and the Galeria Culcuşurilor. In the excavation area (shaded units of the grid system), the outline of the left wall is that visible at the end of the dig; the dash-dotted line indicates the vertical projection of that wall over the surface of the deposit, prior to excavation, in rows 35–37 of the grid, where a narrow fissure separated that surface from the markedly inward sloping encasing rock. The rectangular insert gives the elevations below or above datum reached in the different units that were excavated in 2004–2005.

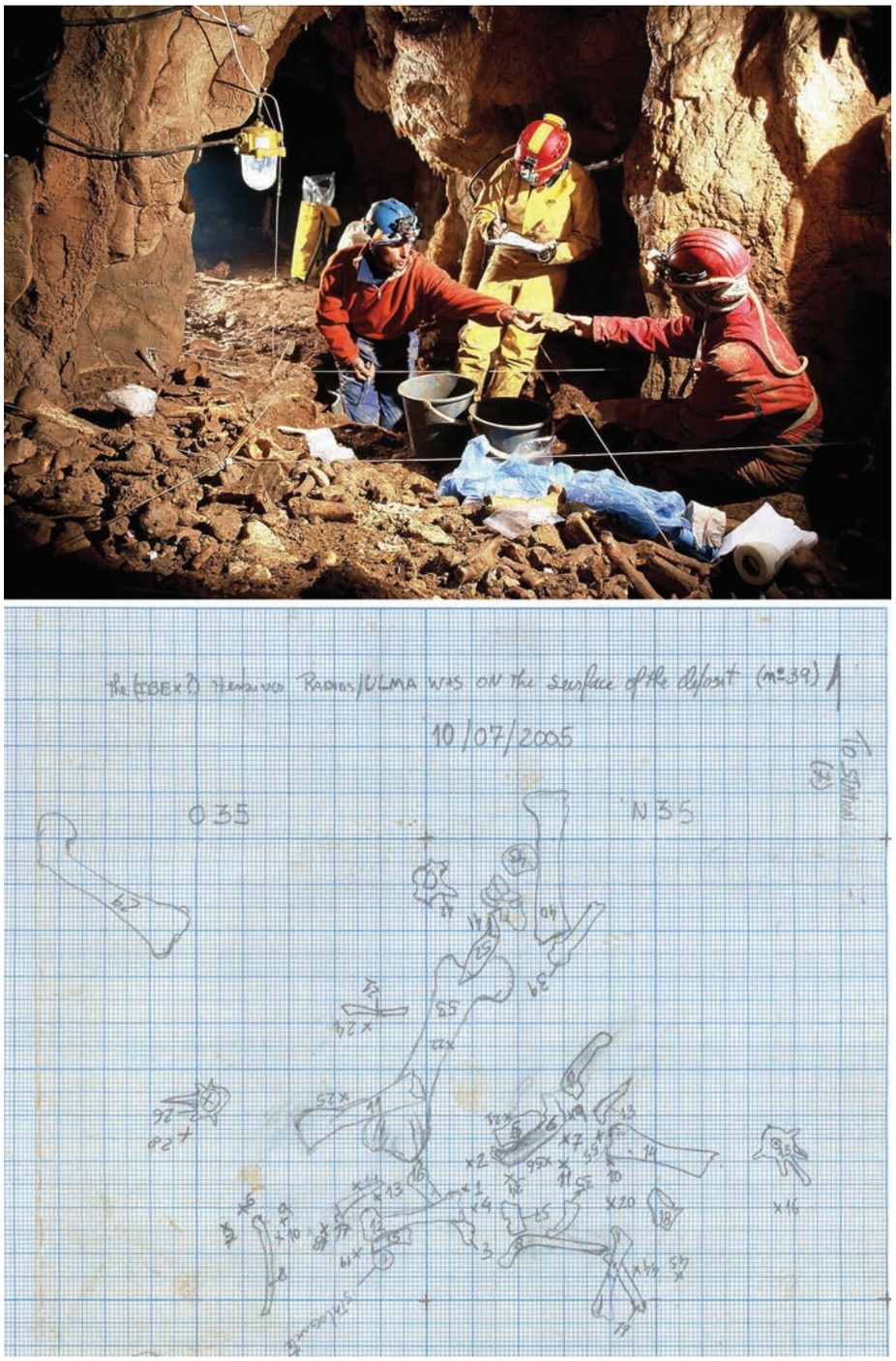

Figure 3.12 The Panta Strămoşilor dig. Top: excavating square N33 (left to right, Milota, Rougier, and Moldovan). Bottom: one of the plans produced in the process of documenting the excavation of the bone bed.

mesh, until an adequate sample for the study of micromammals was obtained. The remainder was stored inside and eventually sieved by the underground team at the siphon, together with the sediments generated by the 2005 dig, and with a 2 mm mesh, as the main purpose of the operation was now the recovery of small-sized cave bear remains, namely, the teeth of fetal or lactating individuals.

Figure 3.13 Using Photomodeler© to map the surface of the bone bed in the Panta Strămoşilor. Three oblique views of grid unit N33 and the reconstructed orthophotograph.

Piece-plotted finds were wrapped up, together with their identification labels, in humidified toilet paper, to protect them against damage during transportation. The smaller pieces were then packed and cushioned in watertight containers. These containers were removed from the cave inside the kinds of yellow "banana" sacks commonly used in speleology to transport equipment. The larger pieces were further bundled in bubble wrap prior to packing them in a plastic clothes hamper fitted into a backpack, an arrangement that permitted its passing through the siphon and the water to drain out when it emerged exterior of the cave. At the end of each field day, both finds and sediments, often totaling a couple hundred kilograms of cargo, were transported through the Poarta, via the Galeria Gururilor and down the Puţul, for sieving at the siphon or further transportation to the outside for lab treatment, via the remaining speleodiving route. The coarser component of the deposits (blocks, pebbles, gravel) was bagged and transported through the Poarta for inconspicuous discard in an adjacent, marginal area of the cave.

Given space limitations in the Panta Strămoşilor, the excavation team on any one day usually consisted of one person excavating, one person mapping in and numbering bones, and a third person wrapping and storing the excavated material. Additional individuals helped move the

Figure 3.14 The project's home base and lab at the Hotel Steier, in Steierdorf at the southern end of the town of Anina. Upper left: Trinkaus washing bear bones in 2004. Upper right: the Timişoara and foreign portions of the 2005 field team with the project's van at the end of the field season (from left to right: Trinkaus, Zilhão, Rougier, Quilès, Gherase, Sarcină, and Rodrigo standing; Danciu and Milota, squatting); the Bucharest portion of the field team (Constantin, Horoi, Petrea, Soficaru, and Constandache) had left shortly before. Lower left: part of a day's bone catch in 2004 drying and waiting to be processed. Lower right: Sarcină and Milota filling diving tanks with the compressor in 2005.

bones and sediment through the Poarta, sieved sediment in the siphon (in 2005), photographically documented the process, and rotated jobs with the three individuals excavating.

Laboratory Procedure

All of the further processing of the finds from the cave, brought out each evening, was done in the rear building and courtyard of the Hotel Steier (Figure 3.14). Most of the bones were covered only in the soft, if adherent, cave earth of the Panta Strămoşilor, and only a few of them had carbonate encrustations on them. The bones were unwrapped, washed in water, set to dry in plastic trays, labeled with square number plus either quadrant letter or specimen number, and then sorted anatomically. Each bone was accompanied by its excavation tag until properly dried and labeled, then entered into a spreadsheet, the "bone log," which became expanded and corrected as anatomical and species identifications were verified in the field and subsequently in Cluj-Napoca.

Part Seven

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