DEIR EL-BAHARI
CLIFF MISSION, 1999

Andrzej Niwiński et al.

The Polish-Egyptian Archaeological and Geological Cliff Mission[1)] has undertaken twofold research on the cliff overhanging the temple of Hatshepsut at Deir el-Bahari. One objective was to carry out an egyptological examination of the area of the cliff that had not been covered by the "Graffiti de la Montagne Thébaine" project of the late 1960s and early 1970s. The other was a geological survey of the cliff face with the goal of estimating potential hazards to the temple and tourists visiting the upper terrace (following its opening to the public in April 2000).

The season lasted from October 9 until November 9, 1999.

1) The mission was co-directed by Prof. Dr. Andrzej Niwiński from Warsaw University and Prof. Dr. Shafia Bedier from Ain Shams University, Cairo. The egyptological team included Messrs. Mikołaj Budzanowski, Tadas Rutkauskas and Sławomir Rzepka. The joint geological research was carried out, on the Polish side, by geologists Messrs. Krzysztof Cabalski and Michał Radzikowski from the Chair of Environmental Protection and Natural Resources, Warsaw University, under the supervision of Prof. Dr. Andrzej Drągowski, and on the Egyptian side by a team of Prof. Dr. Abd el-Hamid Noweyr and Prof. Dr. Abd el-Monem Tawfik from Tanta University.

The inspector representing the Supreme Council of Antiquities of Egypt was Mr. Yasser Youssif Ahmed.

GENERAL LOCATION AND EXTENT OF THE SITE

The cliff closing the Deir el-Bahari circus from the west and separating this area from the Valley of Kings features three levels which are clearly separated one from the other by horizontal shelves, now covered with weathered rock debris (*Fig. 1)*. The first level corresponds to the lower part of the limestone Thebes Formation positioned directly on top of the Esna-Shales – this is the fissured wall overhanging the Hatshepsut temple. Rising some 100 m above the lower terrace of the Hatshepsut temple is the middle level, which is topped by a broad shelf covered with debris that is several meters thick in places. The third level comprises the vertical rocks of the uppermost part of the massif. Work concentrated this season on the southern part of the middle shelf, limited on the north by the mace-like gigantic piece of the cliff that looms over the Hatshepsut temple. The southern limit of the researched area was constituted by the climbing "chimney" positioned over the temple of Mentuhotep (*Fig. 2 and 3*),

The "chimney", where ladders were installed for the team to access the site, is a man-made ancient climbing shaft, about 10 meters high and 1 m wide, hewn in the limestone rocks of the lower level. The floor of the chimney was cut about 1.20 m above the ceiling of an earlier tomb. The tomb was inhabited in Coptic times as evidenced by the crosses drawn on the ceiling and numer-

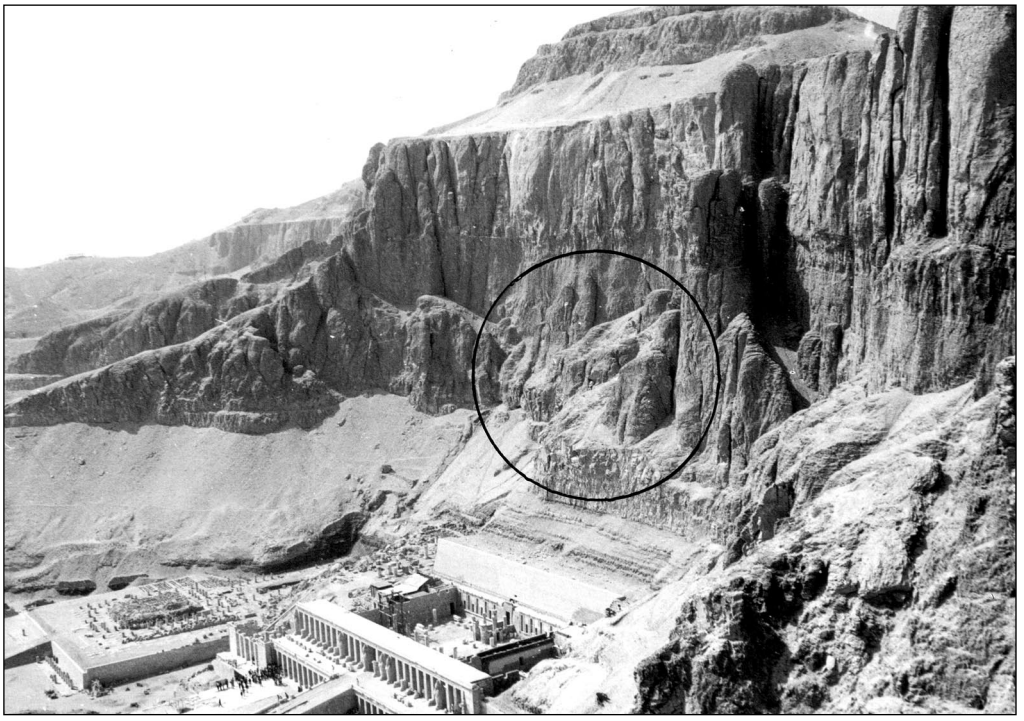

Fig. 1. General location of the site (Photo A. Niwiński)

ous graffiti. More graffiti were found on the walls of the chimney.

A steep and narrow path leads along the cliff face to a passage between the massif and a single huge boulder called the "gate". Some examples of graffiti were recorded on the rock wall siding the path to the west. Beyond the "gate", the path weaves its way

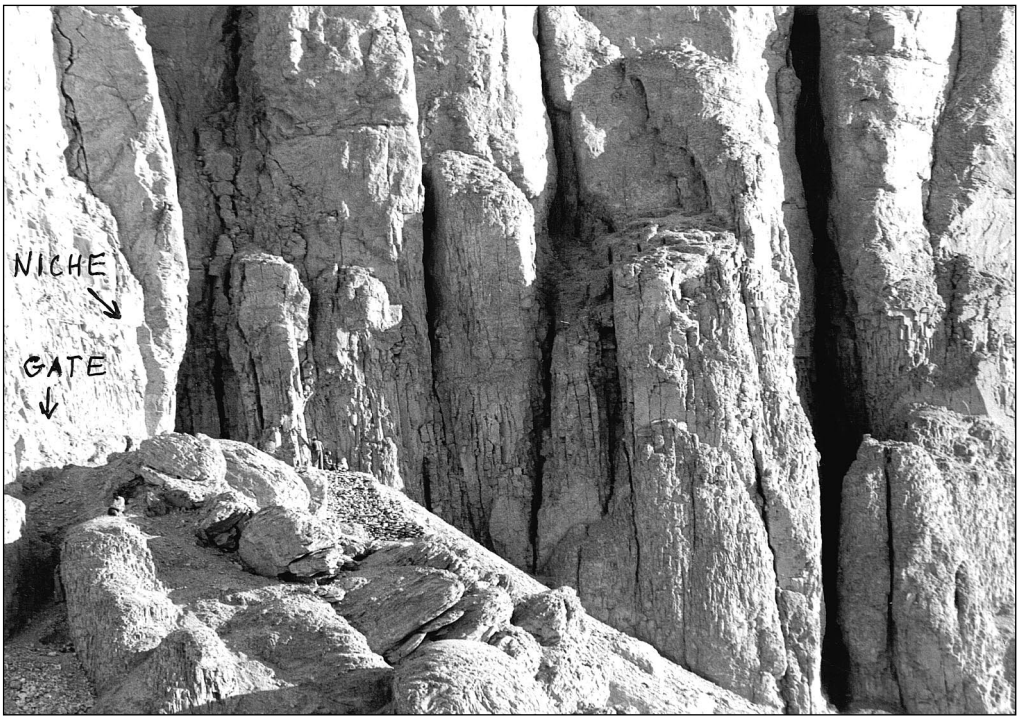

Fig. 2. The investigated area showing the position of the "gate", "niche" and "crevice" (Photo A. Niwiński)

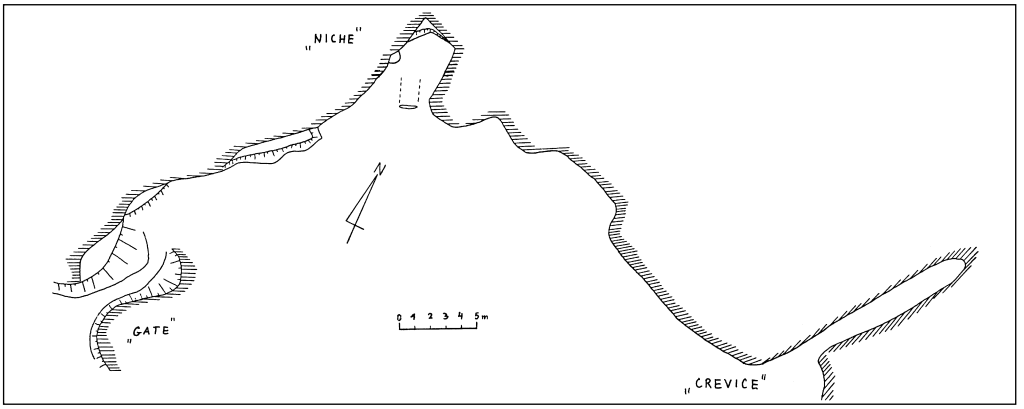

Fig. 3. Plan of the investigated area (Drawing based on surveying by M. Radzikowski and K. Cabalski).

along the cliff, next to huge blocks of stone that litter the slopes, presumably the effect of a heavy earthquake. It is this collapse of rocks that very likely caused the destruction of the temple of Tuthmosis III, and partly of the temple of Hatshepsut. More graffiti were found on the cliff face here.

About 15 meters further north, the cliff takes a sharp bend toward the east, forming what is practically a rectangular niche (*Fig. 4*), once surmounted by a balcony platform about 10 meters higher up. This exists only in residual form, most of it having collapsed in an earthquake; large boulders strewn on the ground here are probably remnants of this structure. The walls of the niche are covered with various kinds of graffiti.

Beyond the niche, the path slopes down toward a long and narrow natural crevice in the rocks. It is about 12 m deep and it ascends steeply towards the north. At its end, it is almost rectangular, about 1.20 m wide. Again, graffiti have been observed on the face of the cliff alongside the path.

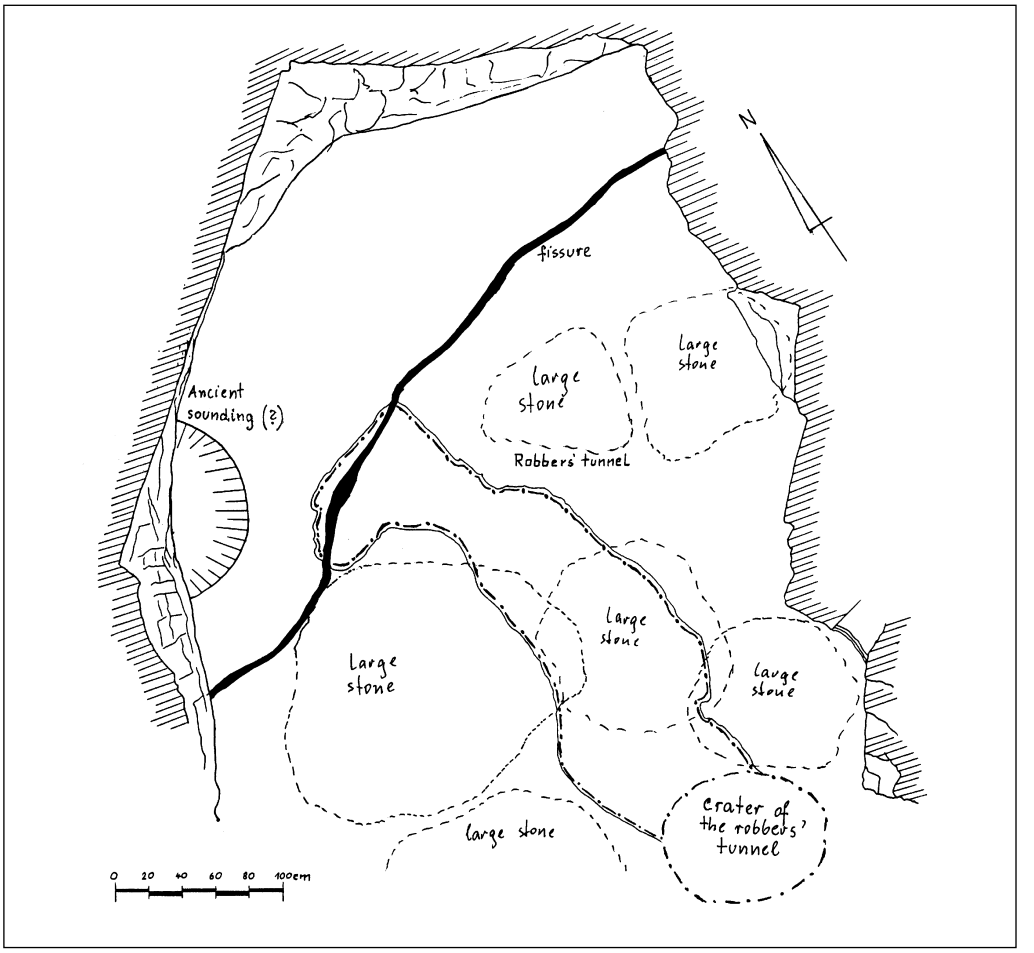

Fig. 4. Plan of the "niche"
(Drawing M. Budzanowski and A. Niwiński)

EXCAVATIONS

The crevice was cleaned of accumulated debris down to bedrock. The layer was about 70 cm deep at most, but it was observed that at some earlier date yet another 70 cm had been removed. Finds comprised a few pottery fragments, including some sherds of Coptic vessels, which should be interpreted as a secondary deposit, probably washed in by the rains (the crevice is one of a few natural drains in this area).

A steady cool breeze inside the crevice makes it a suitable resting place. Some flint fragments and rock drawings showing a bowman, a dog, a fish and a hunted animal may perhaps be interpreted in this context.[2)]

Most of the excavating was carried out in the "niche". Naville must have worked here,[3)] since shreds of international newspapers from the period when he was active

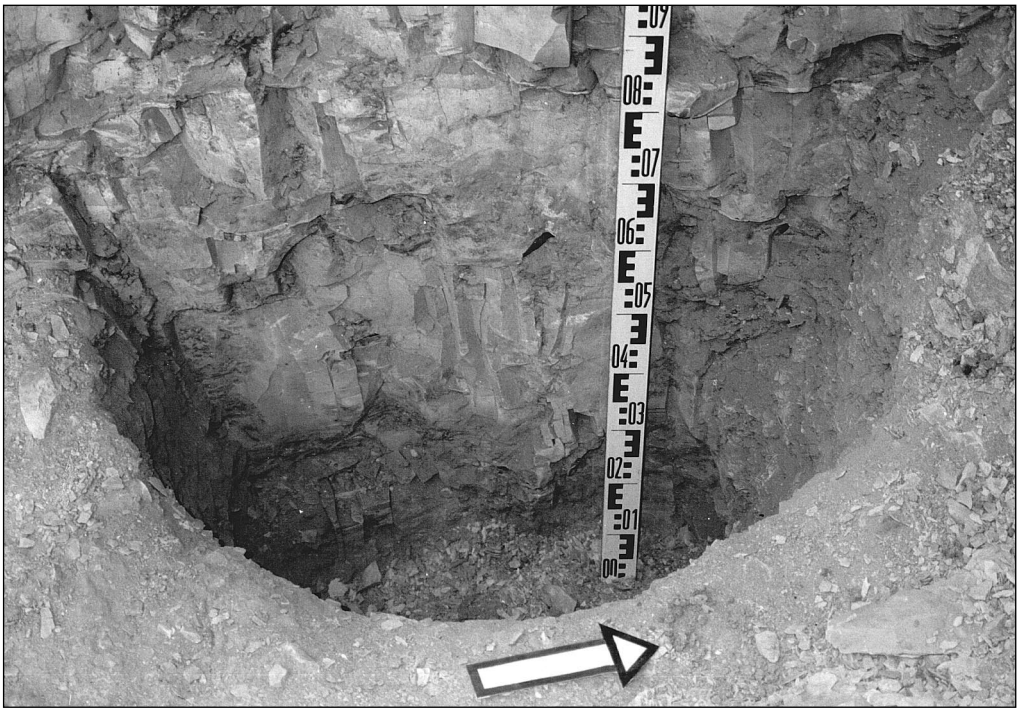

Fig. 5. Semicircular ancient trench in the "niche" (Photo A. Niwiński)

[2)] A leading scholar of Egyptian and Sudanese prehistory, Prof. L. Krzyżaniak (Poznań Archaeological Museum) believes these graffiti may even date from the Predynastic period (personal communication). For an illustration and more details, cf. report by S. Rzepka in this volume, fig. 7 on p. 189.

[3)] In 1897 Naville applied to the Antiquities Service for a concession to excavate the area around the Hatshepsut temple at Deir el-Bahari. *"From want of funds, however, the work was deferred from year to year (...) The "go-ahead" was then given for 1903, but even so it was understood that exploration was to be tentative and that if no immediate results were forthcoming the work would be discontinued"* (Excavations in Egypt. The Egypt Exploration Society 1882-1982, ed. by T.G.H. James (London 1982), 61). Although Naville's reports to the Egypt Exploration Fund include no mention of the works conducted high up in the cliffs, it seems that he had several gangs of workmen working in various spots at Deir el-Bahari in November 1903.

in Deir el-Bahari were brought to light in the surface layers.[4] He removed the top layers of debris, which had probably reached the upper half of the niche, and dug two rectangular trial pits, abandoning the project only when he hit on the boulders. These stones were now removed, revealing the accumulation that had preceded the collapse of the balcony structure. This was a white, very compact layer of limestone debris mixed with wind-blown dust. By the western wall of the niche a semicircular hole filled with much looser debris was unearthed; it was only 80 cm deep and terminated on bedrock (*Fig. 5*; cf. also *Fig. 4*). It may have been a trench to probe for bedrock in this area. A pottery fragment dating to the New Kingdom period was found in the fill.

A tunnel, 80 cm wide and of a similar height, was discovered south of the niche. It was excavated in the compact rubble accumulation immediately above bedrock and stops after about 2.50 m, evidently unfinished (*Figs. 6 and 7*). This tunnel, apparently the work of ancient thieves, appears to have been posterior to the collapse of the large stones, as the entrance to it was located among the boulders; moreover, the combined weight of the falling rock would have probably destroyed such a tunnel.

Once the whole niche was excavated down to bedrock, a fissure was discovered in the rock in the middle of the niche. It is well visible inside the robbers' tunnel, continuing upwards in the layers of the rubble. Since it does not appear in the adjacent cliff walls, it should be construed as the effect of falling rocks.

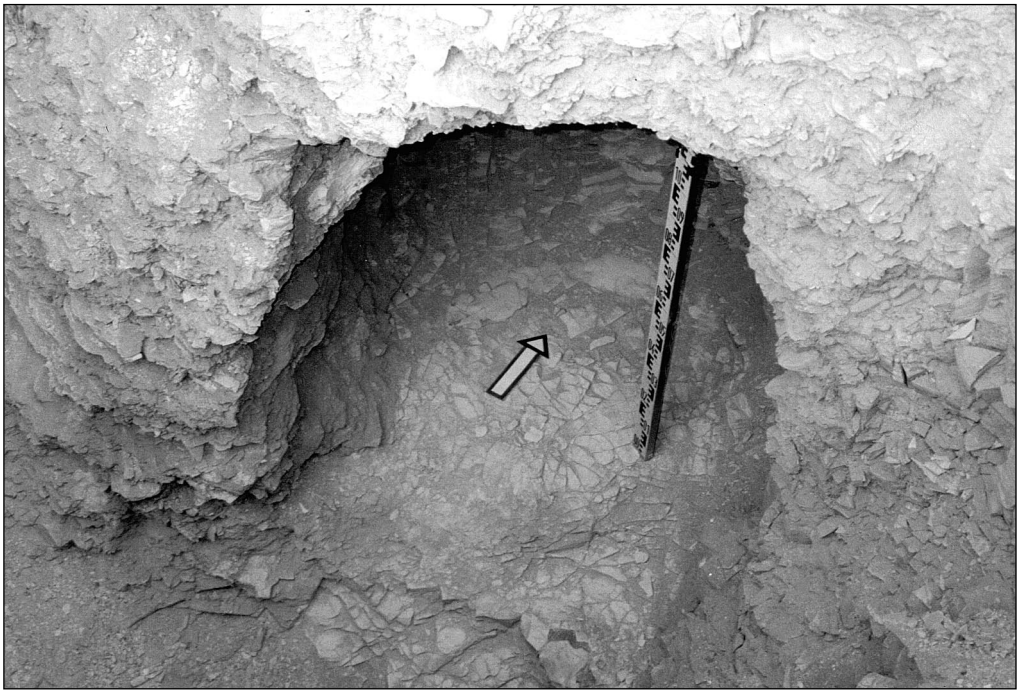

Fig. 6. Robbers' tunnel: the entrance (Photo A. Niwiński)

[4] For example, a piece of the paper "Punch" dated February 7, 1900.

It seems plausible indeed that the place may have been intended as a location for a tomb. In addition to the robbers' tunnel,[5] several hieratic graffiti left by the Royal Scribe Butehamun of the 21st Dynasty[6] hint at a tomb of this period having possibly been planned here.[7] Perhaps the collapse of rocks, resulting from an earthquake or heavy rainfall, resulted in a change of the original project. Excavations in the area shall be continued in the next season.

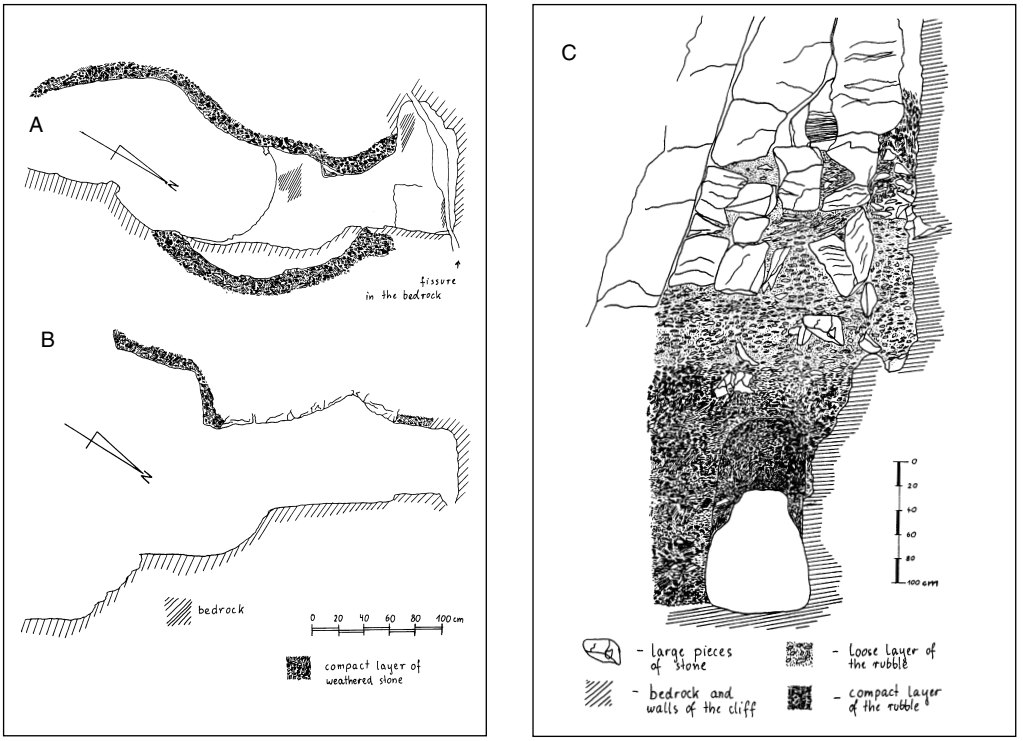

Fig. 7. Robbers' tunnel: A - horizontal section; B - side-view, C - vertical section through the rubble accumulation at the southern end of the "niche" (Drawing M. Budzanowski)

[5] Instances of ancient tomb robbery have been corroborated by the traces of thieves' activity in the tombs from the Valley of the Kings (cf. N. Reeves, The Complete Valley of the Kings (London 1996), 190-193), but only Tutankhamun's tomb offered information on a robbers' tunnel being pierced through the rubble filling the passage leading to the chambers (cf. H. Carter, The Tomb of Tutankhamun (London 1972), 35; Reeves, op. cit., fig. on p. 190). In the ancient documents recorded on Papyrus Leopold II and Pap. Amherst, concerning the robbery detected in the reign of Ramesses IX, there is a mention of two unfinished robbers' tunnels leading to the tombs of the kings Antef V and VII in Drah Abu el-Naga; one of these was two and a half cubits long (P. Vernus, Affaires et scandales sous les Ramses (Paris 1993), 27; R.A. Caminos, in *LÄ* II, 862).

[6] Cf. report by S. Rzepka in this volume, fig. 3, right, on p. 186. It is not clear, however, which of the two officials of the same name left the graffiti in the area of our excavations; cf. A. Niwiński, in: Fs. W. Helck, *SAK* 11 (1984), 135-156.

[7] About tombs of the high priests of Amun of the 21st Dynasty, the location of which has not been determined as yet, cf. J. Černy, in: CAH^3, vol. II (Cambridge 1975), 655-656; A. Niwiński, "Perspectives of researches into the 21st Dynasty in Thebes", in: 50 Years of Polish Excavations in Egypt and the Near East. Acts of the Symposium at Warsaw University 1986 (Warsaw 1992), 266-270.

STUDY OF THE CLIFF FACE[8)]

Part of our investigations focused on the cliff face some 50 m above the "niche". The danger involved in this study required mountaineering methods to be used. All the essential specialist equipment for this task was brought from Poland.

At first approach two ropes were tied at the very top of the cliff. At about 10 m down, a member of the team descending from the cliff edge to the bottom of the niche came upon a ledge, a kind of triangular rock-platform ("balcony") measuring 2.80 x 2.40 x 1.80 m. A 10-m long rope ladder was subsequently installed to facilitate access to the area for the other team members.

Upon close inspection, the face of the cliff revealed several traces of human activity. Two graffiti resembling very much inscriptions were recorded above the southern edge of the "balcony".[9)] Their meaning, however, remains a puzzle. Chisel marks, all made with a round-bar chisel used for dressing flat stone surfaces, were also observed on the northern wall of the ledge. Their presence here is difficult to explain. Most probably somebody wanted to clean or enlarge the area above the niche and, consequently, dropped a few of the fissured boulders down from the balcony. One cannot exclude the tentative conclusion that these tool-mark traces are evidence for preparations made before cutting a new tomb.

GEOLOGICAL SURVEY[10)]

The geological survey carried out during the present seasons is a continuation of studies originally performed in 1985 and 1986 by a team comprising Prof. Dr. Andrzej Drągowski, Prof. Dr. Ryszard Kaczyński and Dr. Jacek Wróblewski, and in the following years by Prof. Dr. Andrzej Drągowski.

The geological fieldwork concentrated on investigating the lithology and tectonics of the area; the fissuring (surface density of fissures Γ_F); weathering processes in the rocks; investigation of the talus shape; rock resistance (measurements done with Schmidt's hammer). Samples of the rock have been collected for further laboratory analyses of principal physical features, rock resistance, mineralogical and petrographic characteristics.

GEOLOGICAL STRATIGRAPHY OF THE DEIR EL-BAHARI AREA[11)]

The stratigraphic succession of Gebel Gurnah, opposite Luxor, is one of the classic sections of the Lower Eocene in Egypt, and the type-section of the Thebes Formation. An excellent exposure of the Thebes Formation lies right above the temple of Hatshepsut in Deir el-Bahari, with a thick interval of green shales – the Esna Shale – at the base. Furthermore, relatively recent excavations around the area of Deir el-Bahari have brought to light the Tarawan Chalk underneath the Esna Shale. At Deir el-Bahari, the stratigraphic succession of Gebel Gurnah exposes Tarawan Chalk at its bottom (observable in pits and trenches at the bottom of the valley). The

8) This part of the report written by Mikołaj Budzanowski.
9) For one of them cf. report by S. Rzepka in this volume, fig. 5 on p. 188.
10) This part of the report written by Michał Radzikowski and Krzysztof Cabalski.
11) This and the following parts of the report are by Prof. Abd el-Hamid Noweyr and Prof. Abd el-Moneim Tawfik.

Esna Shale is made up of two main parts: green shales at the base, and interbedded green shales, and relatively harder yellow marly limestones at the top. The marly bands lie closer to each other and become enriched in lime upward, making the transition into the Thebes Formation. The Thebes Formation commences with fine-grained limestone and chalky limestone rich in bands and nodules of cherts, probably deposited at bathyal depths, and ends with repetitive skeletal limestone and oyster banks formed in a shallow-water setting.

The vertical cliff rising some 200 m in back of the temple is structurally unstable because of the following:

1. The thick limestone succession of the Thebes Formation resting over the Esna Shale. The latter consists essentially of clay minerals, which are structurally unstable, particularly during heavy rainfall.
2. The lowermost part of the Thebes Formation is jointed with relatively close spacing of the joints. This structurally unstable part overlies directly the Esna Shale and stands with its vertical face just behind the retaining wall of the temple.
3. Since the Esna Shale represents the toe of the Thebes Formation vertical cliff, this stratigraphic situation is structurally unstable.
4. The uppermost part of the vertical cliff of the Thebes Formation over the temple consists essentially of closely jointed, flaggy limestone with typical "pile-of-brick" structure. This limestone constitutes the edge of the cliff, and is structurally unstable due to its lithological profile, and to the occurrence of tension joints with very wide openings in different, inconsistent directions and the angle of dip.

FACTORS THREATENING ROCK COLLAPSE

Rock failures are usually of complex origin, with several factors contributing to them simultaneously. The risk factors include:

A. Heavy rainfall from individual storms (as exemplified by the one of Nov. 4, 1994) causing numerous shallow slides, where high water pressure can rapidly reach the slip surfaces of the Esna Shales. The topmost part of the Thebes Formation at the cliff edge characterized by wide opening of tension joints represents the head zone which captures runoff over the cliff and increases infiltration through the very deep joints of the Thebes Formation.

B. The Esna shale toe of the vertical cliff of the Thebes Formation. If removed either naturally by erosion or by an artificial process, it will reduce the resistance to movement of the column-like blocks of the Thebes Formation.

C. Advanced erosion of the top parts of the column-like rocks of the Thebes Formation. Temperature fluctuations and rainwater runoff are working continuously on eroding the "caps" of these rocks. The removal of this material reposing on the natural lines of sliding of rock would diminish its driving force and increase the stability of the large blocks.

D. Vibrations caused by earthquakes, a number of which have occurred in the Luxor area in recorded history.

E. Other vibration-causing potentially dangerous phenomena of modern civilization, such as heavy road traffic

(steadily increasing number of cars coming to the Hatshepsut temple area), loud music and human voices (opera performances have been organized in front of the temple in recent years); vibration from aircraft, in particular helicopters and jet planes flying directly over or near the Deir el-Bahari circus.