T. C. KÜLTÜR VE TURİZM BAKANLIĞI
ESKİ ESERLER VE MÜZELER GENEL MÜDÜRLÜĞÜ

V
ARAŞTIRMA SONUÇLARI TOPLANTISI
I

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PRELİMİNARY REPORT OF THE TEOS/KARAGÖL SURVEY

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I present here a preliminary report of a survey carried out in 1985 and 1986 and the results of related studies. Field personnel were Isabella Sjöström, graduate student in the Department of Archaeology of the University of Newcastle and Amanda Claridge, assistant director of the British School at Rome (1986 only). We thank the Department of Antiquities and Museums and the General Director Nurettin Yardımcı for permission to work at the site and for generous cooperation. Dr. Fikret Tek, Director of the İzmir Archaeological Museum, extended us every kindness. We were ably assited by Haluk Yalçınkaya (1985) and Ugur Hoşgören (1986) who represented the Department. We wish to thank also the following institutions for financial support in 1985 and 1986: the Office of Research and Sponsored Programs and the Office of the Dean of Arts and Sciences of the University of Akron, the National Endowment for the Humanities, the American Council of Learned Societies, and the American Philolophical Society.

In the last ten years, thanks chiefly to the work of Nuşin Asgari and Marc Waelkens, a picture of the many aspects of the Roman Imperial quarry system, in Asia Minor and elsewhere, has begun to emerge[1]. But almost no attention has been paid to the Imperial quarry at Teos, 40 km. South-west of Izmir as the crow flies. Teos was the source of the prized black, red and white marble known as **africano** in the age-old vernacular of Roman marble workers.

Modern work on the quarry began and ended with a short report twenty years ago by Michael Ballance. Ballance identified the Teos quarry as the source of **africano** but did not answer the question which ancient

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(1) See in particular on the Proconnesus quarries, N. Asgari, *Proc. Xth Int. Congr. Class. Arch. 1973* (Ankara 1978) 467-80 and on the trade in prefabricated sarcophagi, *AA* 1977, 329-380, and on Phrygian quarries, M. Waelkens, *AJA* 89 (1985) 641-653; *Die kleinasiatische Türsteine* (Mainz 1984); *Dokimeion. Der Werkstatt der repräsentativen kleinasiatischen Sarkophage* (Berlin 1982).

marble africano is[2]. Pliny in the **Natural History** (36.49-50) speaks of a generally black marble introduced of Rome by L. Lucullus. This **marmor Luculleum,** so named from its patron, must be **africano.** Difficulties with the text of Pliny diverted Ballance himself from identifying **africano** as **m. Luculleum.** Gnoli made the identification but did not solve all the problems[3]. The problem passage of Pliny is usually translated, «(the marble) is in general block, and other marbles are favored because of their markings or colors.» A better translation, incorporating a small change in the text, reads, «... the marble is black by nature although it is recommended **in other respects** by spots or varied colors.» A second problem involves the name of the source of **m. Luculleum,** which is corrupt in the manuscripts. The reading **Chio,** adopted in editions, has in fact less authority than the clearly correct Teo. The fact that Pliny calls Teos an island is not a problem for the text here since he includes it among islands in another passage where the text is not in doubt (5.138)[4].

Plinys tell us all that we know about the early history of the marble and its quarry, and it is pitifully little. (Suggestions that M. Agrippa was the first Roman owner of the quarry are based on a misunderstanding[5].) He says that Lucullus was the first to introduce this marble to Rome. The verb he uses (**invexit**) regularly meant «import.» We should consider the possibility that during his years in the East, Lucullus had acquired ownership of the quarry at Teos and that when he «introduced» the marble to the Romans, he stood to profit handsomely from its popularity. And we do know that **m. Luculleum** caught on quickly since M. Aemilius Scaurus caused a scandal in 58 B. C. by moving a set of 38-foot columns into the atrium of his house on the Palatine (**NH** 36.6). It is also worth noting that the great size of these columns demonstrates that the quarry was already highly developed.

The second of the two ancient references is more problematical. Dio Chrysostom in a brief oration (**Oration** 79.1) dwells on the contrast between useless wealth and a sound body. Teos is given as one example

(2) M. Ballance, «The Origin of *Africano*,» *PBSR* (1966) 79-81; cf. J. B. Ward Perkins, «Marmo 'africano' e 'lapis sarcophagus,'» *RendPontAcc* 39 (1966-67) 127-29.

(3) R. Gnoli, *Marmora romana* (Rome 1971) 149f.

(4) The grounds for this interpretation and for the emendation which supports it are argued in detail in my paper, «*Poikiloi Lithoi*: the Anomalous Economics of the Roman Imperial Marble Quarry at Teos.» forthcoming in the *Proceedings of the Xth British Museum Classical Colloquium* (University of London Institute of Archaeology Monographs).

(5) See my paper cited above, n. 4.

of a city which is not prosperous despite its apparent wealth (in marble, **poikiloi lithoi**).

Dio must have alluded to a condition known to his listeners. We are accustomed to picture the economy of Greece proper as stagnant, but Asia, by every measure, had been enjoying a century-long boom. Although the site of Teos has not been comprehensively studied, it clearly enjoyed some of the building activity that marked healthy towns during the Empire[6]. Dio must therefore have had in mind a malaise more subtle than simple economic depression, namely the segregation of the quarry from the economy of the town and the failure of the latter to share in the aura of wealth (perhaps more illusion than fact) surrounding **m. Lucullеum.** The site itself is important evidence.

The **africano** quarry lies 3 km North-east of the ancient city (Fig : 1). It is reached today by a 400 m stretch of unsurfaced road that joins the the Seferhisar road at the Western end of the arc it forms to leave on the North a conspicuous hill, itself extensively quarried for hard blue-gray limestone. The site (Fig : 2) consists of a lake (the Karagöl) about 100 m in diameter, cleared areas stretching North - west and South-west for more than 100m. very large hills of debris North, North-west, and South-west of the lake. On the North and West debris stretches more than 200m from the margins of the lake; to the South it extends 100m. and only about half that distance on the high ground to the East.

Our efforts on a slender budget in 1985 were concentrated on a reconnaissance of the lake. In 1986 we devoted ourselves to a topographic survey of the site out to the limits of the debris cover and to a subsurface investigation of the cleared areas.

The lake is ringed on three sides surrounded by natural outcrops and deep piles of debris from the workings. The lake is 19 - 20 m deep in the middle and is fringed by reedbeds. It is full of frogs, turtles, and snakes and devoid of ancient features except one long narrow block in the shallows of the indentation in the shoreline at the West (Fig : 3) the

(6) Construction of an odeon; revisions to the gymnasium; a new stage for the theater; the Dionysus Temple restored and dedicated to Hadrian. See the general accounts of George Bean, *Princeton Encyclopedia of Classical Sites* (Princeton 1976) 893f. and *Aegean Turkey*[2] (London 1979) 106 - 15 and E. Akurgal, *Ancient Civilizations and Ruins of Turkey*[6] (Istanbul 1985) 139 - 42. On the French excavations early in this century, see Y. Bequignon and A. Laumonier, *BCH* 49 (1925) 281, reporting the 1924 season; no report was made on the 1925 campaign. The Temple is now being studied by Duran Mustafa Uz and Alain Davesne; see *Proceedings of the VIIth Symposium on Excavation, Survey, and Archaeometry, Ankara 1985 : Survey* (Ankara 1986) 227.

block was above the waterline in July of 1983 when the photo was taken). The water is opaque beyond arm's length because of suspended particulate matter. It is clear that the lake covers an ancient quarry pit. Inhabitants report that the bottom of the lake, which drops away sharply everywhere, has a stepped face at the North-east. In a skin-diving inspection in 1985 I was unable to verify this because of the poor visibility. The water level fluctuates within a range of about a meter and a half, and lake has been reported to flood the level areas around it. The Land and Water Board of the Izmir District (Toprak Su) installed a series of pipes in the late 1970 s which now supply drinking water to Sigacık and Seferhisar and feed the local irrigation network. This demonstrates the vigor of the springs that feed the lake, but it does not help us decide whether the ancient quarrymen had cut into the aquifer or whether subsequent tectonic activity (a line of thermal springs traverses the peninsula at this point) opened the springs.

Since Ballance's visit the site has been reshaped in several ways. A farmer trying to extend his orchard North-east into the cleared area brought in a road grader to remove the debris. The effort was abandoned when the machine enountered a large number of quarry blocks just a half meter below the surface. Fortunately they were stacked neatly along the entrance, road, but several have since been stolen (Fig : 2). Sjöström and I documented the columns in 1986, and our final report will also contain an epigraphical study (carried out in 1983) of the inscribed blocks. A summary follows.

Because some of the blocks are partly buried, it is sometimes difficult to distinguish intact blocks from fragments, but the gross count is 58 pieces, including 10 columns well enough preserved to have measureable dimensions. 40 are of gray marble, frequently streaked by seams of iron oxide and veins of quartz. Eleven of these blocks can properly be called colossal. They are the brothers of the blocks whose astonishing size and elaborote step-cut shapes attracted the attention of travellers for centuries[7]. The largest block has a gross volume of 11.44 m^3 and a weight of ca. 31 tonnes (Fig : 4; the intervals of the range pole are 20 cm). All the 16 inscribed blocks are of gray marble. The 14 which are dated all fall between 163 and 166, thus strongly confirming 166 as the latest attested date for the quarry whether on blocks found at the site or in Italy at the yards of the Imperial marble organization at Ostia and at Rome.

(7) For the early travelers to Teos, see Ruge, s. v. «Teos,» *RE* 5A col. 569 I. Sjöström will study this literature in a chapter of the final report of our Teos survey.

In other respects also the new inscriptions are consistent with those already on record and offer no revelations.

Only 18 of the newly unearthed blocks are of **africano**, and most are small fragments. The quality of stone is generally poor. There is a good deal of quartz, in veins and nodules; large quantities of iron oxide give some of the blocks the appearance of rusting sheet steel. Green tones and silty streaks outnumber the prized splashes of vivid red against black. Although none of these pieces are dated, there is no reason not to assume that they are contemporary with the more numerous gray blocks, and so from the last documented years of the quarry's activity. The poor quality of the **africano** here has its counterpart, I believe, in a noticeable decline in the quality of **africano** used in Italy from the middle or late Ist century onward. This suggests to me that the beds of **africano** were being worked out and that the quarry may have been abandoned around 170 C.E. for that reason.

A second intervention by heavy machinery occured when road crews came later to collect gravel for road surfacing from the flat area between the two debris hills North and North-west of the lake. Here Ballance had seen unbroken debris around the lake[8], but there seems to have been a natural (or at least long-standing) depression beyond the lake to the North. The debris hill directly North of the lake has had its entire curving flank sculptied by graders on two levels, one 3 m above the other over the floor of this area.

The picture of human presence is completed by two dwellings, a sumptuous villa crowning the hill (natural) S. of the lake built by a Mr. Necati Atıl Akkan and a modest farmhouse just West of the villa.

Two very unusual aspects of this quarry strike the observer immediately: the whole site is very small, and actual quarry face inclines downward into the ground. The latter goes against the strong Roman preference for working above the surrounding ground level (for obvious reasons of ease in moving the blocks), and so this must result from a combination of sheer necessity and the desirability of the product.

Among Imperially owned quarries, the Karagöl is by far the smallest. Moreover, a large part of its output, at least toward the end of its productive life in the second third of the second century, was not **africano** but an undistinguished gray marble frequently penetrated with veins of quartz and iron streaks. For very sound economic reasons the

(8) Ballance, *PBSR* 34, p. 80.

Emperors generally chose very large deposits which were also near the sea, such as those of Proconnesus and Carrara. Two questions about Teos present themselves: are there other quarry faces now covered by the debris? and are there other sources in the area, under Imperial control or not? The second question remains to be answered. In the vicinty of Seferhisar there are reported to be several subsidiary quarries, the largest at Benler (also called Beyler)[9]. For administrative reasons we were unable to visit these sites. The importance of these quarries remains to be demonstrated, and we suspect that they produced only inferior grades of **africano.** But we will have to await documentation from our Turkish colleagues.

The first question becomes more urgent in light of the fact that most of the Karagöl quarry's output was not **africano** but an indifferent gray marble. To search for buried quarry faces we employed a seismic refractor. Ideally a refraction survey indicates not only the depth of bedrock below the soil surface but yields also the profile of the layer (s). Unfortunately we were able to complete only a partial survey of the South-west cleared area. The results are not unambiguous but do seem to show a deep fill of consolidated debris[10] No evidence appeared for a bedrock of hard limestone here. The survey could have missed a high-speed layer at depths of 20 m or more, but common sense urges that such an impressive quarry configuraton would have left unequivocal superficial clues.

It remains possible, even likely that marble was quarried in the area until it was exhausted and a stratum of the kind of clastic melange seen around the lake was encountered. Furthermore, the presence of so many blocks in this area suggests that it was an active workshop area, at least at the end of the quarry's life. As Nuşin Asgari has shown us, such workshope are usually found in immediate proximity to extraction sites[11]. Further, the epigraphy of Teos speaks of three branches **(bracchia)** of the quarry[12] at least one of which was probably under the South-west cleared area. But even if **all** of both cleared areas **cover** such quarry faces,

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(9) M. Baran and G. Petzl, *Ist. Mitt.* 27-28 (1977-78) 301-08; paper delivered by Arch. Duran Mustafa Uz at the VIII Symposium on Excavation, Survey, and Archaeometry (Ankara 1986).

(10) I am most grateful to Prof. A. W. Gerhard Kunze, Department of Geology, The University of Akron, for helping design the survey and analyzing the seismic data.

(11) N. Asgari, *Proc. Xth Int. Congr. Class. Arch. 1973* (Ankara 1978) 467-80 on the «summerside» workshops on Proconnesos; cf. Fant, *AJA* 89 (1985) 659f.

(12) *B(racchium) III* is named on many blocks: Bequignon, *RA* 28 (1928) 206f. no. 9, and Teos Survey nos. 83-1, 7, 8, 14.

the total surface area including the lake comes to only about 25000 m², still the smallest of the major quarries.

Two independent and disparate sources of information confirm that the supplies of **africano** were considerably smaller than were those of the other Imperially-owned polychrome marbles. One is epigraphical and involves analysis of the marks cut into dressed blocks. The other affords a means of quantifying the use of **africano** (and other marbles) at Rome.

Most of the Imperial quarries inscribed dressed blocks and columns with two serial numbers. The number preceded by **N** for **N(umero)** seems to have identified pieces approved for shipping to Rome[13]. Even if we cannot be dogmatic about the purpose of these serial numbers, we can safely take them as one index of annual output which can be set next to the same index from other quarries. If we compare a control set of the highest **N(umero)** numbers from each quarry, the output, of Teos is the smallest of the Imperial polychrome marble quarries by factors ranging from 2 to 4.5[14].

(13) L. Bruzza, «Iscrizioni dei marmi grezzi,» «*AnnInst* 42 (1870) 109; O. Hirschfeld, *Die kaiserliche Verwaltungsbeamtem bis auf Diokletian* (Berlin 1905) 163, 166; Ch. Dubois, *Etude sur l'Administration et l'Exploitation des carrières... dans le monde romanie* (Paris 1908) XIV; Bequignon, *RA* 28 (1928) 189.

(14) The Five Highest *N(umero)* Numbers from the Most Important Imperial Polychrome Marble Quarries Compared:

Quarry	*N(umero)*	date	reference
Teos	140		Teos Survey 83-1
Teos	85	75	Bruzza no. 148
Teos	80	70/80's	Bruzza no. 166
Teos	159		Bruzza no. 186
Teos	139	160's?	Teos Survey 83-4
average: 120			
Chemtou	283	Domitian	Baccini no. 76
Chemtou	613	107	*CIL* VIII 14560
Chemtou	606	149	*CIL* VIII 14578
Chemtou	517	150	*CIL* VIII 14580
Chemtou	305	183	*CIL* VIII 14588
average: 539; as percent of Teos: 449 %			
Docimium	434	Domitian	Bruzza no. 302*
Docimium	144	96	Baccini no. 35
Docimium	228	99	Baccini no. 36
Docimium	421	lost	Bruzza no. 262
Docimium	135	146	Ostia Museum no. 3992C
average: 272.4; as percent of Teos: 227 %			

A second index of the production of Teos comes from a census of ancient marble columns in Rome conduceted by Faustino Corsi in the early 1800 s. If we handle Corsi's numbers cautiously, we can compare the five chief Imperial polychrome marbles to one another as a percent of the columns in Rome. Teos accounts for only 9 % of the total, much less than might be expected [15].

This picture goes a long way toward explaining the surprising lack of **africano** in the decoration of buildings in the great cities of Asia Minor. A traveller familiar with the use of marble in Italy is struck by this absence. There is also less **pavonazzetto,** for instance, than there is in Italy; but in Asia there **are** conspicuous displays of it, like the Library of Celsus and the colonnade of the less well-known **Marmorsaal** of the Harbor Baths at Ephesus, to name only two. But I know of no similar use of **africano,** and the incidental fragments I have noted are very few, even — or rather, espacially — at Teos itself. Only tight Imperial control could have reversed the usual distribution pattern of a heavy material like marble whose cost rose steeply with distance from the source.

Now I believe that we are approaching an understanding of Dio Chrysostom's remark about the failure of the **poikiloi lithoi** of Teos to benefit the town. If the entire output of the quarry was reserved for

Karystos	242	Baccini no. 52
Karystos	330	Bruzza no. 23
Karystos	341	Bruzza no. 42
Karystos	250	Bruzza no. 63
Karystos	347	Bruzza no. 127
average: 302; as percent of Teos: 252 %		
Chios	250+	Bruzza no. 191
Chios	166?	Bruzza no. 203
Chios	168	Bruzza no. 204
Chios	142	Bruzza no. 206
Chios	149	Bruzza no. 209
(the sample is too small to be reliable)		

Baccini = P. Baccini Leotardi, *Marmi di cava rinvenuti ad Ostia e considerazioni sul commercio dei marmi en età romana (Scavi di Ostia* X, Rome 1979).
Bruzza = «Iscrizioni dei marmi grezzi,» «*Anninst* 42 (1870) 106 - 204.

(15) F. Corsi, *Delle pietre antiche*[3] (Rome 1845):

Africano/m. Lucculleum (Teos)	09 %
Cipollino/m. Karystium (Euboia)	43
Giallo antico/m. Numidicum (N. Africa)	14
Pavonazzetto/m. Phrygium (Phrygia)	18
Portasanta/m. Chium (Chios)	16
	100 %

Rome, there could be no local trade in the marble (since it was not a sculptural marble, there was no question of sculpture workshops in any case). There were no dealers, no middlemen, no artisans. There was no mechanism for the city of Teos to share in the value attached to **africano** and the high price it drew in Italy [16]. The quarry operated outside the usual channels of private enterprise. Even on the level of manual labor the Imperial quarries created little demand since most of the motive power was provided by **damnati ad metalla.** The engineers and foremen were a cadre of Imperial technicians and were not local men. The only certain way in which the quarry was linked to the local economy is food, and these expenditures (for a labor force of several hundred) must have constituted a strong subsidy to local agriculture [17]. But we cannot be sure that any other staple, such as iron for forging tools, was bought locally rather than imported by sea directly.

Thus the quarry was almost entirely divorced from the city. It contributed little to it and took nothing from it, not even its name. Teos, because of its former glory, provided Dio with a particularly poignant example of the sterility of wealth, but its genteel obscurity under the Empire was already of long standing, and quarry nearby served only to throw an ironic light upon it. 12

(16) In the Price Edict of A. D. 301 *m. Luculleum* was assigned a maximum price of 150 *denarii* per foot. 200 is the highest price listed, and we must remember that the transport component of that price must have been very small because of the quarry's easy access to harbors.

(17) Miss Joyce Reynolds kindly reminds me in a letter that the importance of such purchases should not be urged too strongly since the Imperial bureaucrats were likely to hold down the prices they would pay for local produce.

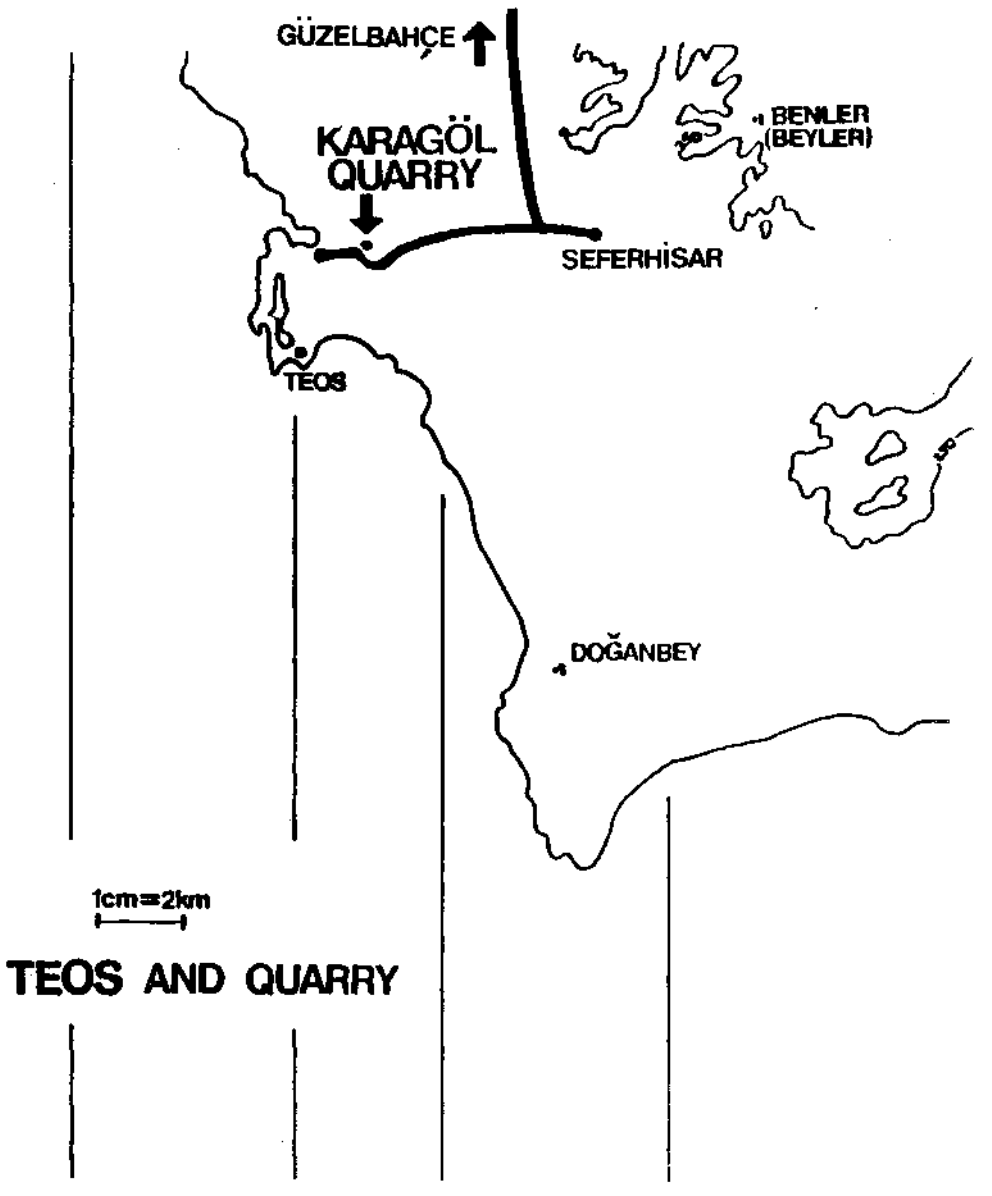

Fig. : 1 — Teos and the Vicinity of the Karagöl Quarry

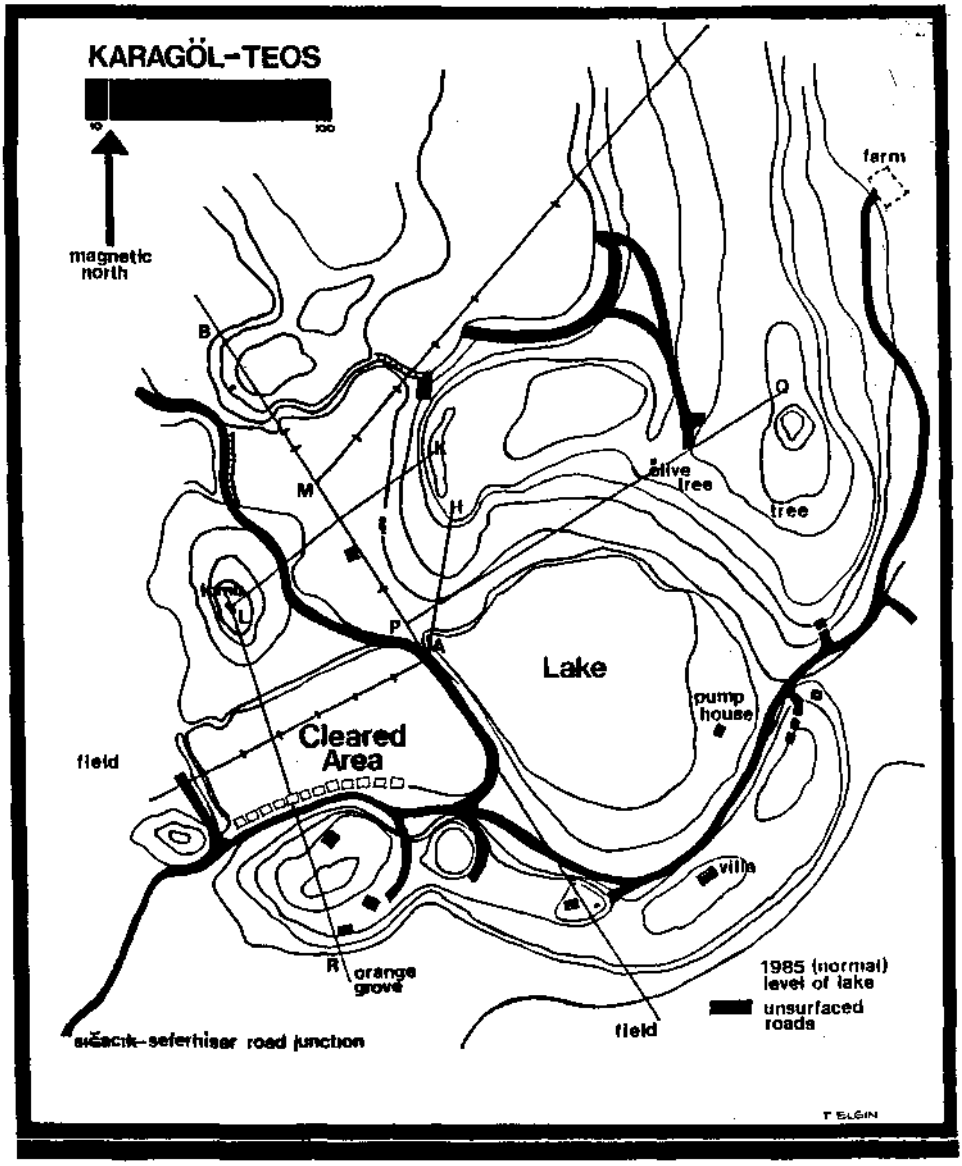

Fig. : 2 — Preliminary plan of the site of the Karagöl Quarry.

Fig. : 3 — View north - west across the Karagöl

Fig. : 4 — The largest of the blocks (ca. 30 tonnes). Discovered in the Cleared Area.

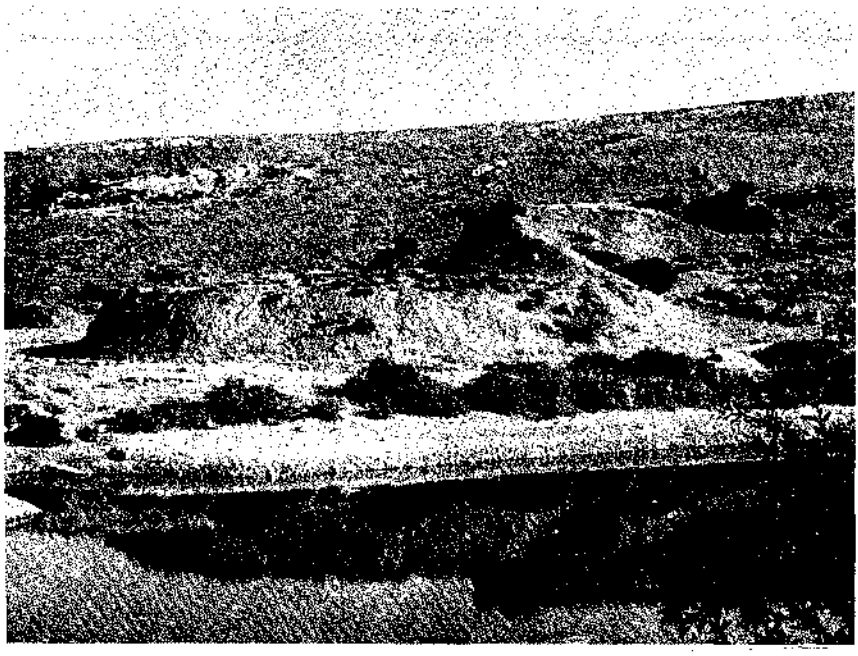

Fig. : 5 — View north across the Karagöl to Debris Hill

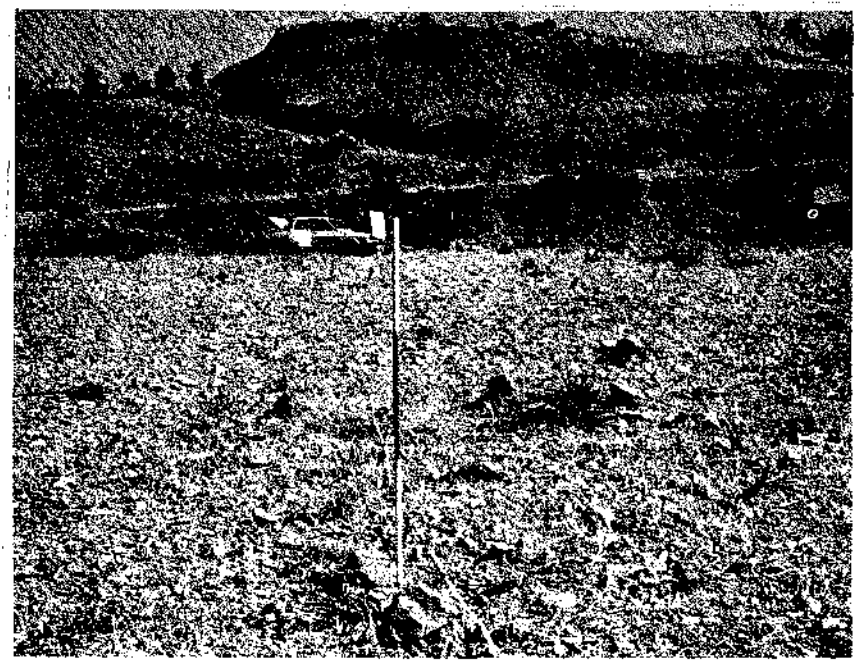

Fig. : 6 — Line of the Seismic Refraction Survey across the Cleared Area