

# ANCIENT MINERS SHOVELS AND ORE CARRIER DISCOVERED IN ESPIYE - BULANCAK AREA

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**ABSTRACT.** — During exploratory, drilling activities conducted by Etibank in the Giresun area in 1969, several ancient mines were discovered in Karaerik mine locality (Espiyé town) and at the slag heap located near Tekmezdar borough Eriklik village (BulancaK town).

The ancient miners' shovels made of the stump of an alder tree were recovered in an ancient adit discovered at Karaerik, whereas the ore carrying trough, made of chestnut, was found in an ancient gallery at the slag heap of Tekmezdar borough.

The age of the ancient miners' shovels and the ore carrier were determined through C-14 analyses. These findings are very important as they contribute substantially to the understanding of ancient underground mining practices carried out by the early inhabitants of Anatolia.

## I. INTRODUCTION

Eastern Black Sea Region is characterized by rich copper, lead and zinc deposits. Numerous discoveries made in the present area, indicate to the fact that mining operations date back to times immemorial and had been mainly carried out to meet the copper requirements of the early inhabitants of the area. Giresun area in particular, is believed to have been the focus of intensive mining operations. Several ancient mines and slag dumps found at Karaerik mine locality, 6 kms south of Espiyé and at Lahanos (formerly known as Lahnas, a typical minority village at the time of Ottoman Empire) located 15 kms south of Espiyé, deserve mention in this context (Fig. 1).

It is interesting to note that Lahanos is located in an area where slags resulting from ancient copper refining activities had been dumped and it is estimated that as much as 50,000 tons of copper slag is present in the area (Topkaya, 1962). Other slag deposits, such as those found at the Karaerik mine locality (300,000 tons) (Kovenko, 1939), Karılar (15,000 tons) and Ağalık (Ağalık) (50,000 tons) are also evidences of ancient metallurgical processes carried out in the present area.

Although mention has only been made of the known slag deposits found in the Espiyé area, which may be expressed in terms of several thousands of tons, similar deposits and ancient mines, are also discovered in the Giresun area. Although some authors (e.g. Kovenko, 1939) believe that the mining operations date back to 2000 B.C. in the present area, this cannot be proved due to lack of sufficient evidence. We do however know that foreign companies had started copper mining in the present area by the end of 19<sup>th</sup> century (Alpay, 1954). Alpay reports that some Italian and British companies, mined copper ore in the period between 1885 and 1900. It should however be noted that to locate some of the ancient mines or to reevaluate those found is almost impossible since in the years prior to World War I and shortly after the establishment of the Republic, state sponsored research activities have unfortunately led to considerable destruction of such ancient remnants, which were further exposed to the prying of local inhabitants and natural factors. Thus the evaluation

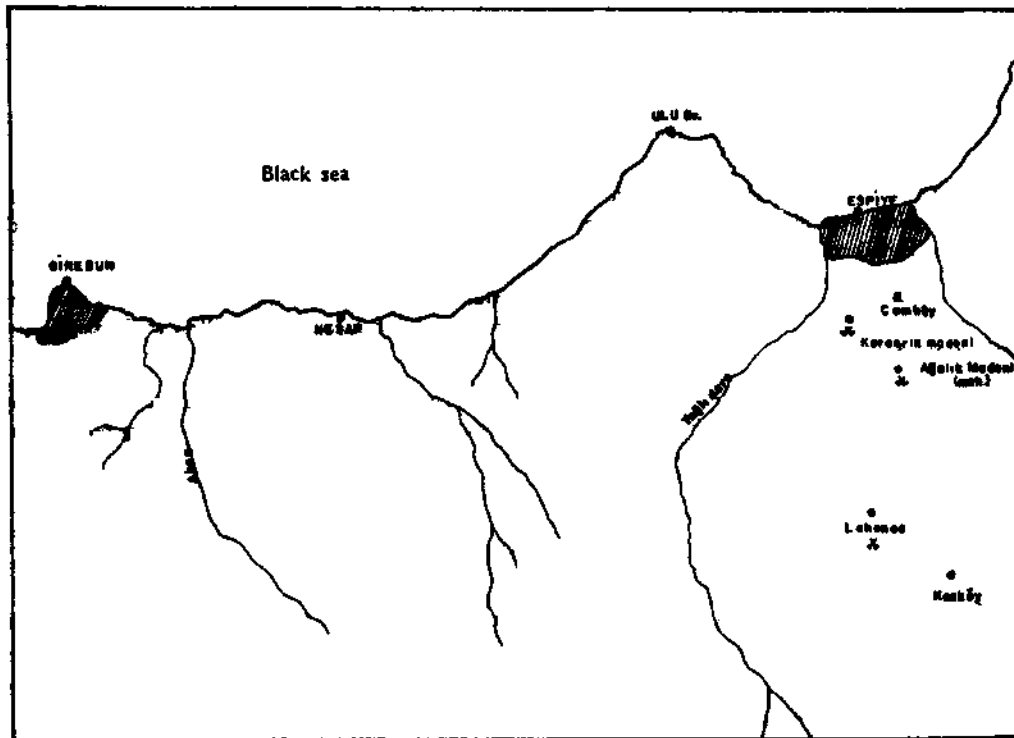


Fig. - 1

and classification of these ancient near-surface mines, if not all, is impossible. The writer believes that the ancient mines and slag deposits found in the Giresun area should be taken as an indication that the underground mining operations and metallurgical processes have been carried out for centuries by the inhabitants of the area.

In some ancient mines, e.g. Karaerik and Tekmezar, which although destroyed considerably, may still be entered, ancient miners implements are found. Such ancient materials may, at present, only be used to determine the date of mining operations within certain limits and their role and significance in the mining history (Kovenko, 1939, 1943; Kieft, 1956).

Re - evaluation of Giresun-Tirebolu, Köprübaşı; Giresun-Espiye, and Labanos deposits, in terms of their respective Cu-Pb potential, has shown that these deposits shall continue, to maintain their significance in the future years also.

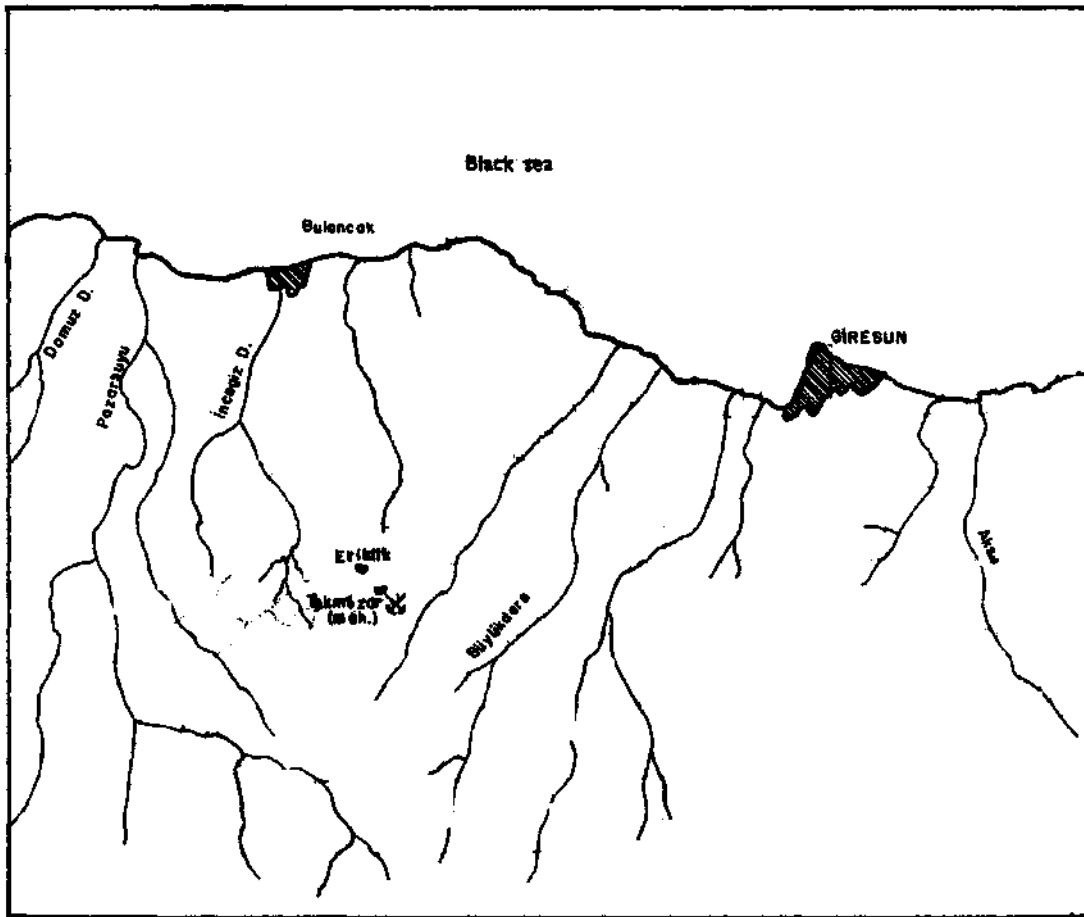
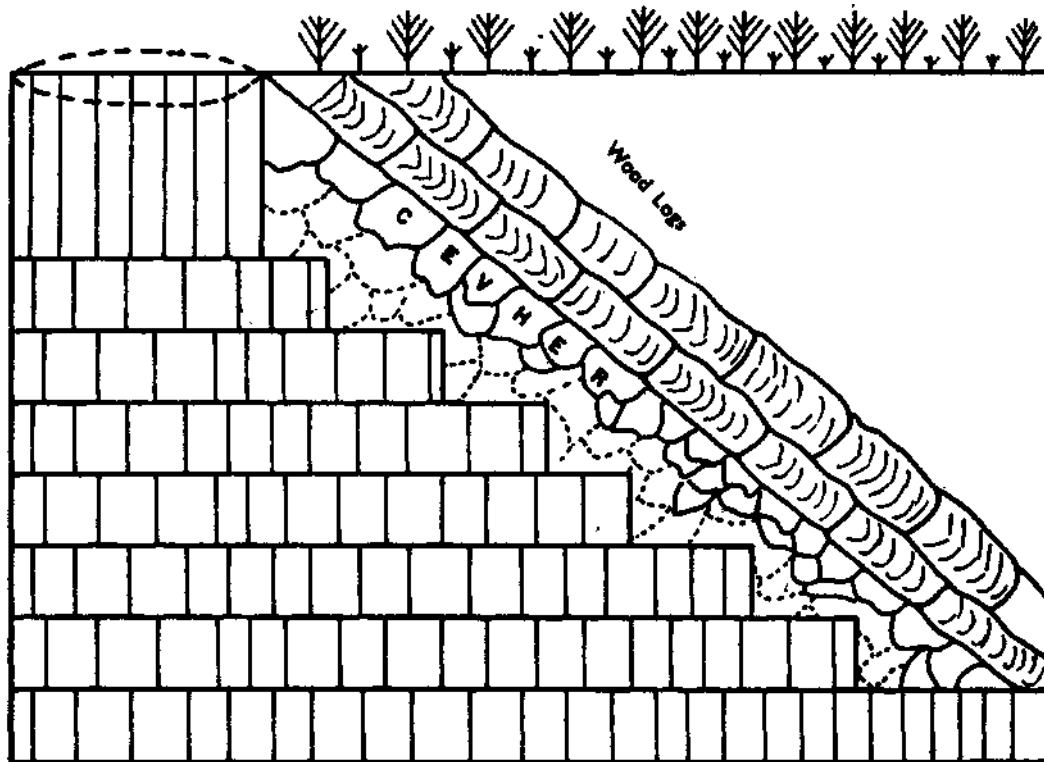


Fig. - 2

## II. CLASSIFICATION OF ANCIENT MINES

Ancient mines found in some parts of Anatolia may be classified as follows:

1. Those apparently in the form of pits and penetrating a maximum depth of 10-15 meters below the surface;
2. Those apparently in the form of pits but also comprising of a narrow adit driven along the mineralized zone in the E-W or N-S direction;
3. Mines consisting of an inclined adit, driven from the surface to the maximum depth to be penetrated;
4. Mines consisting of an inclined adit driven from the surface to the maximum depth to be penetrated and step-like structures to enable the miners to penetrate further along the mineralized zone;
5. Those apparently in the form of a pit near the surface but continuing in the form of steps (Fig. 3).



**Fig. - 3**

Ancient miners' implements to be discussed here were found in mines belonging to groups (3) and (4).

It is believed that the ancient miners chose to transport ore to the surface following the removal of unwanted material due to difficulties experienced during haulage and used such rocks etc., as filling material to prevent slumps in the mines.

Mines described above and the methods employed to extract ore contribute substantially to our understanding of underground mining operations carried out in Asia Minor since prehistoric times. It therefore is also possible to consider ancient ore mines in two major groups;

- a) those developed in years B.C.
- b) those developed in years A.D.

Ancient miners' implements discussed here were found in mines belonging to group(b).

**III. SITES OF DISCOVERY**

**A. Espiye Materials**

Karaerik mine, where ancient miners' shovels were discovered is located 6 kms south of Espiye, Giresun Province (Fig. 1).

During the exploratory drilling activities conducted by Etibank in the Karaerik mine locality in 1969, an ancient mine was discovered. The adit, approximately 100 meters long, had been driven in a chalcopyrite deposit, mined for-copper in historical times. Two miners' shovels were, found in a zone consisting of copper sulphate rocks and containing covelline minerals (Photo 1, 2), as well.

In the area under discussion a slag deposit, as mucrras 300,000 tons, was also found. Optical spectrographic semi-quantitative analyses made on the samples collected have shown the following results:

Cu 1.5 %	Pb 0.07 %
Zn 2 %	Ni 0.002 %
Fe more than 10 %	Co 0.03 %

Although on the basis of results, given above, it is difficult to conclude that the early metallurgical processes employed in the area, had been entirely directed to the production of copper ingots. The presence of several ancient mines and slag deposits, which may be expressed in thousands of tons, are concrete indications of long-lasting copper mining and refining in the area,

**B. BulancaK Material**

The ore carrying trough was discovered in a slag dump, located in the near vicinity of Tekmezdar borough, 3 kms south of Eriklik village (BulancaK, Giresun Province) (Fig. 2).

The ore carrying trough was discovered in an ancient adit, 17 meters long, during exploratory drilling activities conducted by Etibank in the present area in 1969. The trough was recovered at a distance of 12 meters from the entry (Photo 3). The adit runs parallel the mineralized zone for 12 meters and continues in the form of step-like structures for 5 meters. Local timber had been used for reinforcement. Slag deposit located in the near vicinity of this mine is estimated to be 25 - 30,000 tons approximately.

**IV. DESCRIPTION OF MATERIALS DISCOVERED**

**A. Espiye Materials**

1. *Ancient miners' shovel (skovel-a)*

<b>Locality of discovery</b>	<b>: Espiye - Karaerik mine locality.</b>
Item discovered	: Miners' shovel (Photo 1).
<b>Era</b>	: —
Measurements (in cm):	a. Length of blade.....21.1 (Fig. 4)
	b. Width of blade.....10
	c. Thickness of blade.....1.3-2.5
	d. Length of handle.....34.6
	e. Thickness of handle.....3.2
	f. Total length of shovel...55.7

Characteristics: The material used in the miners' shovel discussed here is the stem of an alder tree; the quality of workmanship being good. The shovel has been preserved well as it was found immersed in copper sulphate containing ground waters. The handle and the left hand side rim of the blade are missing. Pack of the handle is hollowed inwardly for 7 cm to provide ease during handling (Fig. 4).

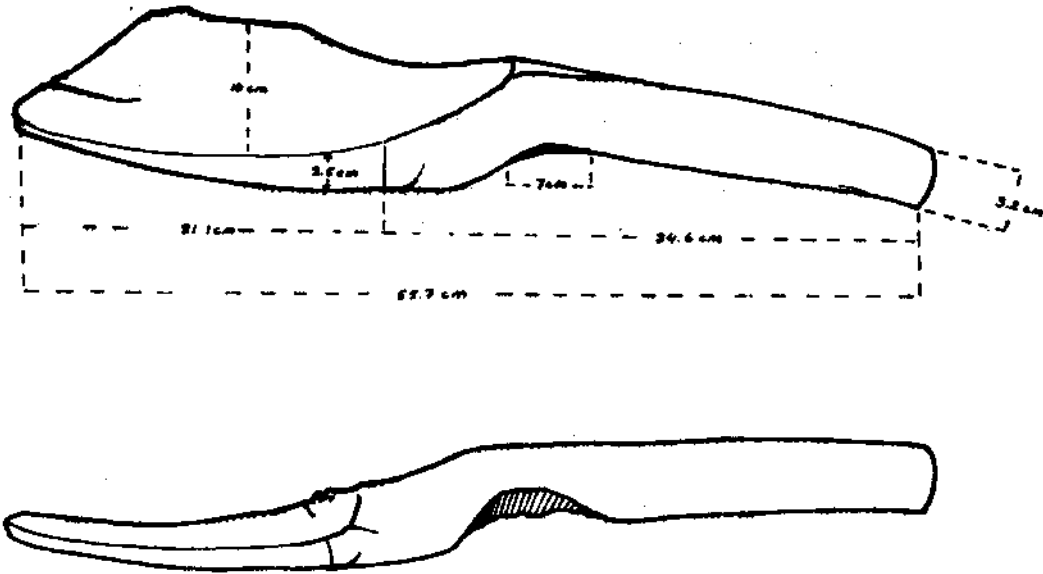


Fig. - 4

The left rim of the blade has been considerably worn out by shovelling from right to left. The concave space, as much as 7 cm long, carved on the back of the handle, facilitates handling and is large enough to make room for four fingers of a hand and is believed to have been carved by the person using the shovel.

It is further believed that the shovel had been used for a long time and on the back side in particular, the effects of copper oxides are very distinct. The traces left by the copper oxides on the back of the handle, i.e. on the concave space, are oval shaped, whereas those found on a thin section of the handle are essentially in the form of rings. The miners' shovels discovered in the present area are well-preserved against natural effects as these were found immersed in copper sulphate containing ground waters.

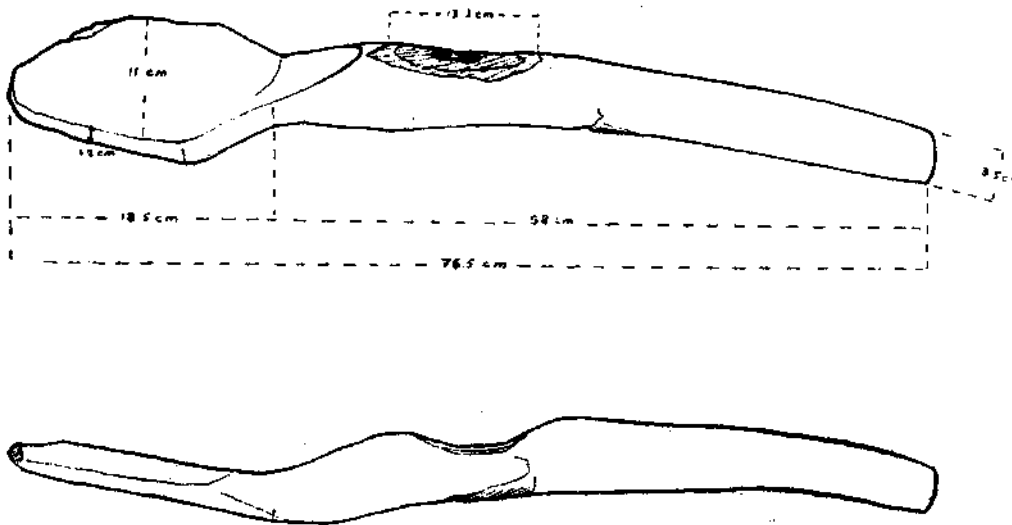
## 2. Ancient miners' shovel (Shovel-b)

Locality of discovery : Espiye - Karaerik mine locality.

Item discovered : Miners' shovel (Photo 2).

Era : 11-13<sup>th</sup> centuries,

- Measurements (in cm) : a. Length of blade. . . . . 18.5 (Fig. 5)  
 b. Width of blade. . . . . 11 1/2  
 c. Thickness of blade. . . . . 1-1  
 d. Length of handle. . . . . 58  
 e. Thickness of handle. . . . . 3.5  
 f. Total length of shovel .... 76.5



**Fig. - 5**

Characteristics: The material used for shovel-b, is the stem of an alder tree. The traces of copper oxide are distinct on both sides of the blade and on the handle as well. A concave hollow, as much as 13.3 cm long, had been carved on the front side of the handle. The right hand side rim of the blade is missing. Although the handle, is also missing partly, it is quite long, thus displaying a certain degree of disharmony.

3. *Comparison.* — Same type of material, i.e. stem of an alder tree, is used for both shovels. The quality of workmanship is better in shovel-a. Shovel-b, however, displays a distinct disharmony regarding the blade and the handle (Photo 2). The concave space, carved on the back of shovel-a and as much as 7 cm, appears on the front side of shovel-b and is as much as, 13.3 cm long. In shovel-a, the left hand side of the blade is worn out, which is in contrast with the fact that in shovel-b the right hand side of the blade is considerably worn out and missing. This may have been due to the fact that the miners using these shovels in ancient times, shovelled in opposite directions. It is also believed that the handles of these shovels were used, in the case of necessity, to remove the rocks and this may explain the fact that the handles are in part missing. The handles must have been worn out and broken during such toiling. The handles would have been preserved in good condition, should they had not been used to remove and tear away boulders of rocks.

## B. Bulancak Material

### 1. Ore carrying trough (ore-carrier) (Photo 3)

Locality of discovery : Slag deposit near Tekmezar borough, 3 kms S of Eriklik.

Item discovered : Ore carrying trough.

Era : 11-13<sup>th</sup> centuries.

Measurements (in cm) : a. Length.....118 (Fig. 6)  
 b. Width.....24-25  
 c. Depth (inner).....6.5  
 d. Hole diameter.....7  
 e. Height of holes from base . . . . .10-11

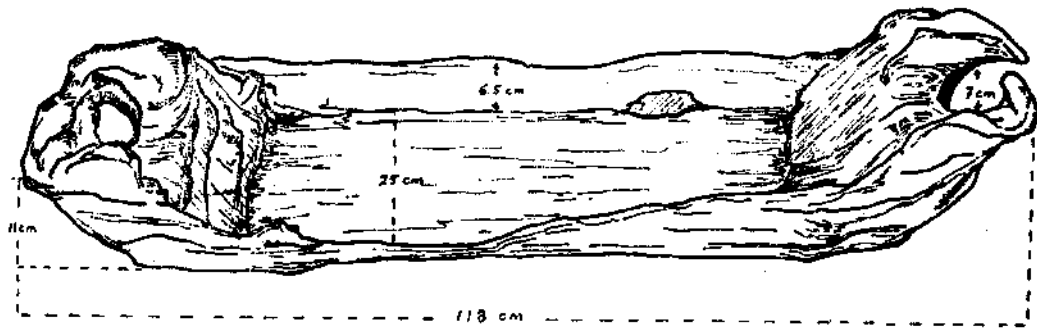


Fig. - 6



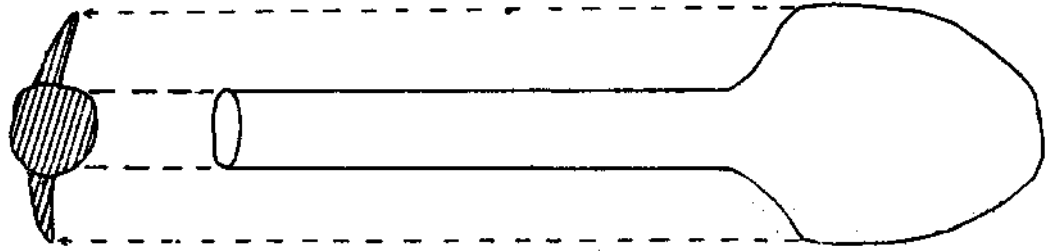
## V. TECHNIQUES EMPLOYED

### A. Espiye Materials

Shovels a and b are made of the stem of an alder tree, and in the part of the stump used for this purpose, the growth rings are transversally parallel on the handle and on the upper surface of the blade (Fig. 7, 8). This feature observed on the shovels emphasizes the success of the technique employed in their making, through preventing possible breaking during usage. Should the growth rings in the stump used had been longitudinally parallel, the lifetime of the shovels must have been considerably shorter. The technique employed in these shovels used by the ancient miners living in Asia Minor some 9 centuries ago, should be taken as a concrete example of the knowledge and experience possessed by the inhabitants of the area since times B.C. (5).



Fig. - 7



**Fig. - 8**

### **B. Bulancak Material**

The material used for the ore-carrier is the kernel of a chestnut stump, split along its diameter and possibly 109-112 years old; the growth rings in the tree lie transversally parallel to the holes opened at both ends of the ore - carrier, thus imparting it strength. It is believed that the technique employed by the ancient miners in the making of the ore - carrier, has been developed through experience.

## **VI. AGE DETERMINATION**

### **A. Espiye Materials**

1. *Ancient Maters' Shovel (Shovel-a)*
2. *Ancient Miners' Shovel (Shovel-b)*

Both shovels are exhibited at the Mineralogy Section of the Natural History Museum of M.T.A., in a space particularly dedicated to Mining History of Turkey (inventory numbers are 76.892. a and 76.892. b). Analyses of the samples taken from shovels a and b at the laboratories of the Physics Department of the Middle East Technical University, by  $^{14}\text{C}$  method gave the following results:

1. Ancient miners' shovel (shovel-a)  
Results obtained from the analyses of samples taken from this shovel are not reliable.
2. Ancient miners' shovel (shovel-b)  
 $789 \pm 74$  before 1950 A.D.  
 $1161 \pm 74$  A.D.

Samples taken from shovel-a were analyzed three times, the results obtained each case being unsatisfactory and unreliable. Although in such cases the analyses of more samples in necessary as the results to be obtained are used for comparison purposes, additional samples are not taken from shovel-a to avoid any ruin on the general form of the object in question.

The age obtained for shovel-b may also apply to shovel-a since both objects are recovered from the same locality. This assumption is further supported by the fact that the material used in both shovels is the same type of tree, i.e. alder tree. It may therefore be concluded that the Espiye - Karaerik mine and other mines located in the near vicinity had been operated by the inhabitants of Anatolia as early as the period between 11-13 th centuries the lack of additional material which may be used for further comparisons, however, prevents the determination of the exact date of first operation of these mines.

## B. Bulaacak Material

1. *Ore - carrier*. — The date obtained for the ore carrier by the 5568 radioactive half- life C-14 method is given below:

958 ± 75 before 1950

992 ± 75 A.D.

## VII. COMPARISON WITH SIMILAR FINDINGS

### A. Espiye Materials

Ancient miners' shovels found in Karaerik mine, may be compared with the ancient miners' shovel discovered in Anayatak, Murgul mine, dated to belong to the second half of the first millennium B.C. It must however, be noted that the shovels discovered in the Karaerik mine area, date back to 900 years ago, and in contrast to the low quality of workmanship of the shovel found in Anayatak, ancient miners' shovels a and b, found in Karaerik display a higher quality of workmanship, and may be compared with the modern shovels. In Figure 4, details of shovel-a (Photo 1) are shown. Shovel-b, which differs from shovel-a in its shape and workmanship, is shown in Figure 5 (also Photo 2).

Hollow spaces carved on the handles of both shovels (Fig. 4, 5), facilitate handling. These characteristics, however, are absent in the ancient miners' shovel discovered in Anayatak, Murgul mine. The only common feature of the ancient miners' shovels discovered in Anayatak and in Karaerik, is that both are made to be used for the same purpose, although they belong to entirely different centuries. Another common feature of these shovels, is the material, i.e. stump of a tree, used in their making.

### B; Bulançak Material

The age obtained for the ore - carrying trough by C-14 method cannot be confirmed due to lack of other similar findings, which would otherwise have served for comparison purposes also. Thus it may be concluded that the ore - carrier is unique, as it represents the only discovery of this type, made in Turkey.

## VIII. CONCLUSIONS

The shovels and the ore carrier discovered in the ancient mines, of Espiye and Bulançak areas and made of alder and chestnut respectively, suggest that the ore deposits located in the Giresun area as a whole, had been mined by the inhabitants of the region in the period between the 11th. and 13th centuries.

The ore carrying trough is, on the basis of material available, unique since it is the only discovery made of this type. It is also presumed that the ore carrier described here, has been used by the ancient miners, with considerable success, in the mines comprising of inclined galleries, and may well be considered to be the prototype of the modern equipment employed for hauling purposes.

' Due to lack of similar findings the age obtained for the shovels and the ore carrier discussed here, by C-14 analyses, cannot be confirmed. It should however be noted that the age determined for the ancient miners' shovel discovered in an ancient gallery in Anayatak, Murgul mine,

by C-14 method (second half of the first millenium B.C.) confirms the fact that the ore deposits located in the Eastern Black Sea Region were not only mined in the period between the 11-13<sup>th</sup> centuries but since pre - historic times. The age obtained for the ancient miners' shovels and the ore carrier discovered in Espiye and Bulancak, therefore, hardly reflects the date when underground mining operations were first started in the area.

Ancient mines are for the most part destroyed during modern investigations aimed to the development of new mines, thus their contribution to the understanding of mining history of Turkey, being considerably reduced. Although the materials contributing to the understanding of the mining history of Turkey are very limited, ancient miners' shovels and the ore carrying trough discovered and the slag deposits as well, emphasize the role and importance of Giresun area in the mining history of Asia Minor.

Ancient miners' shovels and the ore carrier discussed here, deserve due importance as these undoubtedly help us to understand the history of underground mining operations, from view point of materials and techniques used in their making.

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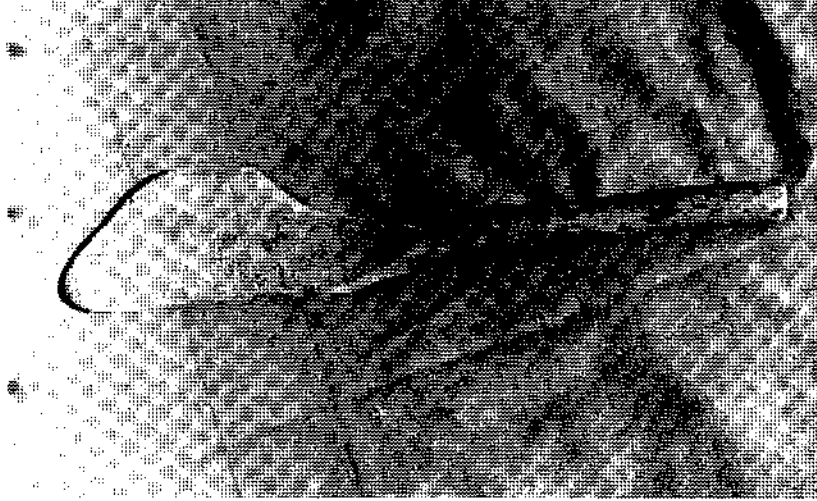


Photo 1

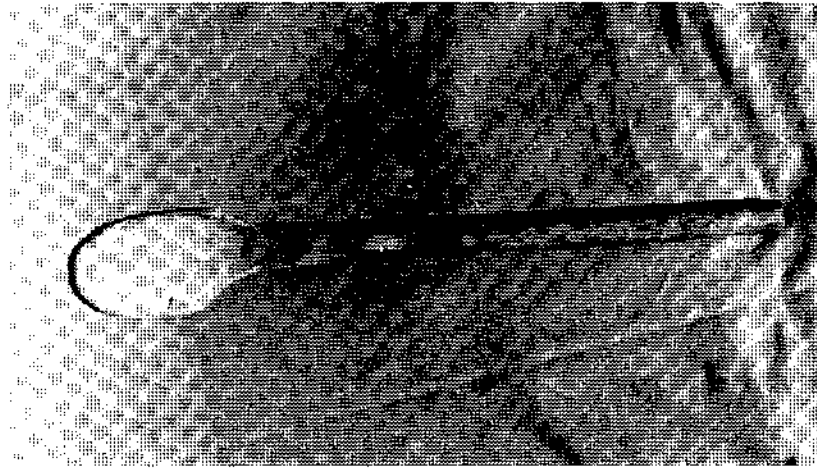


Photo 2

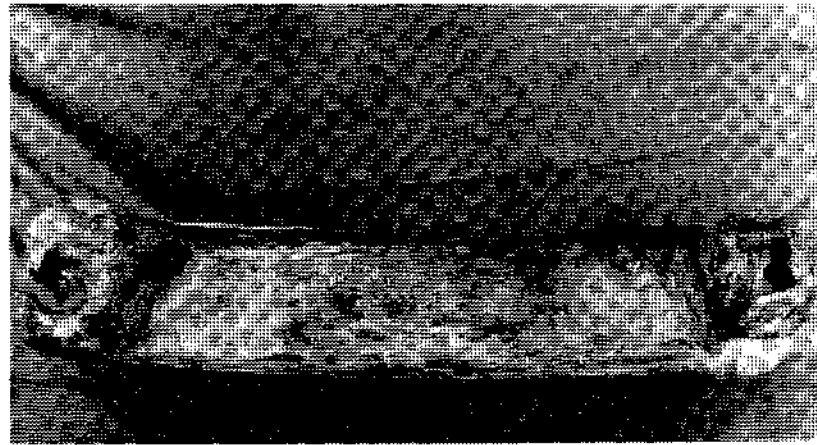


Photo 3

Paris - April 1979

Sessions of the International Geological Congress have been held every four years since 1878. The 26<sup>th</sup> session will celebrate the Centenary of this organization convened under the auspices of the International Union of Geological Sciences.

*Organization Committee:* Chairman : Jean AUBOUIN

Secretary General: Paul SANGNIER

*Timetable:* - 26 June to 5 July - Pre - congress scientific excursions  
- 7 to 17 July - The Congress will meet at the Palais des Congres at Porte Maillot  
- 18 to 27 July - Post - Congress scientific excursions.

### Scientific program

1. *Opening scientific meeting:* Leading specialists will survey five main themes concerning the current state of scientific progress.

2. *Sections:* The proposed program covers almost the entire field of the Earth Sciences and is divided into 20 sections. The Organization Committee has also planned to have the work of the various international scientific organizations affiliated with the International Union of Geological Sciences integrated into the program of the Congress. Authors are free to choose their own subjects for communications and these should be sent to the Secretary General before 1 October 1979 for the publication of abstracts.

3. *Colloquia:* The program for the colloquia was chosen so as to illustrate the main themes of current scientific and economic interest. There will be seven in all and they will be chaired by leading scientific figures. Communications to the Colloquia are made by invitation only.

### Excursions

The Organization Committee in association with the National Committees for Geology of 18 European countries has organized an attractive program of geological excursions. The chosen themes make it possible to offer Congress participants a survey of all aspects of the geology of Western Europe. 85 different excursions each lasting for 9 days are planned from 26 June to 6 July 1980 or from 19 July to 26 July 1980. Since only a limited number of persons can participate in the excursions the places will be reserved by the Organizing Committee in October 1979 in the order in which the reservation forms were received.

### Exhibition

An exhibition to be called «GEOEXPO 80» will be held in the same premises as the Congress from 7 to 11 July 1980. It will be open to all international institutions and will make it possible for exchanges of ideas and contacts to take place with scientists from all over the world.

## Social Program

Since the **Congr** is taking place in **Paris** the organizers will be able to plan a very attractive program for the participants and a special program for persons accompanying them.

## State of advancement of con paration

80.000 copies of the first circular were sent out in october 1977. By 1 **december** 1978 the Organization Committee had received 5,800 answers from 114 different countries and 4,000 persons had asked to take part in the excursions. The second circular is now available and contains **the final** registration form.

Those interested in participating in the Congress and wishing to the second circular should request it from **the**:

Secretariat General du 26<sup>eme</sup> Congres Geologique International

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