

## Application of placer gold morphology to gold exploration

### Приложение на морфоложките изследвания на злато при неговото проучване

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### Introduction

Placer gold undoubtedly carries some of the features of endogenous gold. The physical and chemical characteristics of such gold are influenced by many factors: the nature of the primary gold, the water force, the morphology of the river bed, the length of transport and the chemical composition of the water in the river. In the Republic of Macedonia has identified a large number of localities in which the presence of gold has been determined in the alluvions and streams of sediments.

The analysis of the morphology of gold is of great importance in areas where there is gold in the stream sediments, although the primary mineralization has not yet been discovered.

Changes in the morphological characteristics of placer gold during transport are in function of the distance. Many studies describe these characteristics in terms of the origin, the type of the sources, the relationship between placer gold and the source (Tishchenko, 1981; Hérail et al., 1990; Youngson, Craw, 1999; Marquez-Zavalía et al., 2004; Rasmussen et al., 2006). Classification schemes that include qualitative and quantitative parameters such as shape, size, roundness, flattening, surface texture or sphericity are made.

### Results

In this study, will be shown the morphological forms of gold particles in terms to determinate the potential primary source rocks from several localities in Republic of Macedonia (Fig. 1).

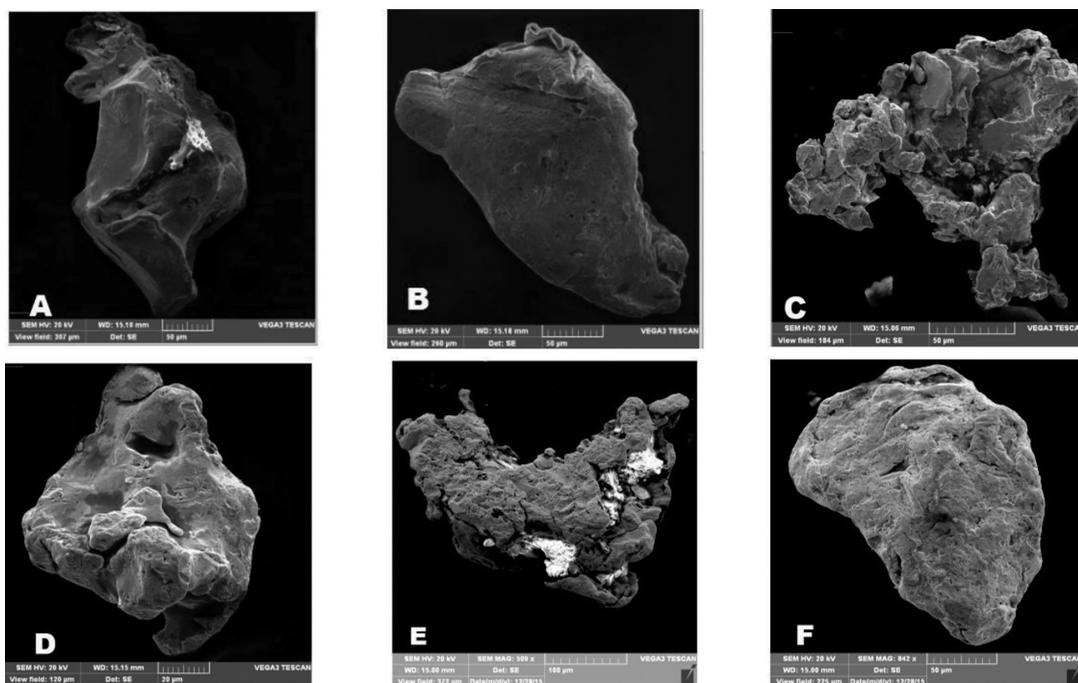
These are gold aggregates from the Meckin Dol alluvials in the Bucim Ore Region (5 sample), the alluvium of Lukar and Stara Reka, the Kozuf volcanic area (11 sample) and the alluvium of Pekljanska Reka (12 sample) in the eastern part of the Republic of Macedonia.



Fig. 1. Map with placer gold occurrences in Republic of Macedonia

In this study will be described the morphological forms of gold particles in terms to determinate the potential primary source rocks. The golden aggregates found from the mentioned localities are characterized by various forms (Stefanova et al., 2013, 2014, 2016): elongated (Fig. 2A), platy (Fig. 2B), elongated irregular (Fig. 2C), irregular (Fig. 2D). Such forms indicate a small distance from the primary source, considering the length of the alluvions in the investigated locality.

Flattening, folding, and rounding during fluvial transport modify the outline and shape of gold particles. Many investigations show that morphological transformations are a function of distance and environment of transport (Hérail et al., 1990; Knight et al., 1994, 1999). In this way it can provide information regarding travel distance with respect to source which are concerning on transport mechanism and sedimentological environment.



**Fig. 2.** Morphological forms of matching alluvial gold aggregates: *A*, elongated gold grain with partially sharp edges – Meckin Dol; *B*, aggregate with platy elongated form – Meckin Dol; *C*, irregular elongated gold grain – Stara Reka; *D*, irregular gold grain – Lukar; *E*, irregular gold grain with complex morphology – Pekljanska Reka; *F*, aggregate with platy form – Pekljanska Reka

Gold particles are characterized by branched or complex outlines in the primary environments (Youngson, Craw, 1999). Modification of outline started at first few kilometers when initial forms undergo transformation toward more complex, equant and elongated forms (Fig. 2).

Modification is manifested by rounding and minor infolding. As increases downstream transport, flattening, folding, rounding of particles, become more evident. Opposite of outline, roundness of gold particles commences as soon as it begin transport in the fluvial system, and rounding is generally progressive with increased transport distance, mainly as results from abrasion of particle edges or folding of delicate protrusion and thin edges as it can be seen in.

The study of gold grain forms is one of the many approaches to determine the primary source of gold aggregates which is used in gold exploration.

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