by malachite (in rare cases with azurite), serpentinite, carnelian, agate, coal (jet), marble and shells. Some of the carnelian beads from Varna display 16+16 facets along their elongation, which is the first record for a constant and complex faceting of hard mineral known so far. An early prehistoric weight system links mineral beads and gold artefacts (the weight unit "van" is introduced, 0.4 g = 2 carats). The first report of turquoise beads for SE Europe is related to the Orlovo prehistoric site (Haskovo district). The "Thracian stone" in ancient sources is identified also as heliotrope, which is known since the Chalcolithic in the Eastern Rhodopes. Some of the artefacts are masterpieces of art and as stage of perfection, thus pointing to the Balkans as a cradle of prehistoric gemmology.

The use of GNSS technologies for application in mining, geology and geodesy in Bulgaria

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A review on the use of GPS technologies for application in mining and geology on territory of Bulgaria is presented in this paper. Some particular results concerning the application of GPS in opencast mining in Bulgaria are presented and analyzed. The essentials of them are periodical survey of mine working; investigation of slope strain; management of output and transportation of mining mass. In the area of geology and geophysics are discussed some results on application of GPS on: geological mapping and assaying; gravity investigations; deformation of earth's crust; investigation of landslide processes; coordination of platforms for oil and gas production etc. Plans for future work on the above issues are discussed too. The problem of the combined processing of GPS and other types of classical geodetic measurements concerning the higher accuracy of the result is still topical. In the proposed paper a better accuracy in the vertical component of the GPS-networks has been sought. It is suggested that the results from the spirit levelling expressed by heights should be used. Observation equations of heights (orthometric or normal) can be included in the mathematical model for processing of GPS measurements. In these equations a simplified model of geoid (quasigeoid) is involved. A numerical example for the combined processing of GPS measurements with EDM and spirit levelling heights has been presented. The results confirm the expected higher accuracy of the height component.

Efficiency of the Chiprovtsi mining site remediation with regard to heavy metal and arsenic environmental pollution

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A Program for the liquidation of the inefficient ore-mines in Bulgaria was started by the government in 1992. One of the main goals of the program is to eliminate the negative consequences of the mining industry to the environment. Restoration and remediation measures are envisaged for the mining sites only but not for the affected areas outside as the heavy metal polluted rivers and their floodplains. Evaluation of the efficiency of the environmental recovery of the mining affected landscapes in the upper part of the Ogosta River basin, NW Bulgaria, is the overall purpose of this study. Three mines (Au; Fe; Pb-Ag)

operated in the region from 1951 to 1999 and the remediation activities ended in 2004. The levels of As, Pb, Zn, Cu and Cd were determined in the river water (109 samples), floodplain ground water (3 samples), river channel (97 samples) and floodplain sediment (44 samples), haplic Luvisols, LVh, FAO, 1998 (16 samples), grass vegetation (25 samples), sheep's milk (6 composite samples from 800 animals) and goat's milk (1 composite sample from 19 animals). Seven sampling campaigns were carried out in the period 2005-2007. The studied trace elements were measured with the means of AAS-GF, ICP-AES/OES/MS and XRF in the laboratories of the University of Mining and Geology of Sofia, Humboldt University of Berlin, Acme Laboratories (Canada) and the Ministry of agriculture and food of Bulgaria. The results show As and Pb as the main contaminants in the local environment, associated mostly with the river channel and floodplain sediments along the Ogosta River and its initial tributary Chiprovska River. The mean As value (median) for the channel sediment is 1170 mg/kg (min 16 mg/kg; max 80390 mg/kg) and 1117 mg/kg for the floodplain sediment (min 43 mg/kg; max 26946 mg/kg). The mean Pb levels for the same media are 178 mg/kg (min 10 mg/kg; max 15205 mg/kg) and 282 mg/kg (min 43 mg/kg; max 2982 mg/kg), respectively. The mean As value exceeded the Dutch intervention value 21 times for channel sediment and 20 times for floodplain sediments. The same quantities for Pb were 0.3 and 0.5 times, respectively. Levels above the imperative values of the EU directive 75/440/EEC were detected in river water mostly for As, which ranged between 0.002 mg/l and 0.621 mg/l, with mean value of 0.053 mg/l. Two general patterns of vertical metal and arsenic distribution were revealed in the polluted floodplains. Type 1 is typical for the floodplain sections lower than 1m where the contaminants increase in depth and ground water pollution with As is established. Type 2 is the common one for the floodplain between 1-2.5 m above the usual river level. Trace element accumulation in the upper sediment layers is typical in these areas. Lead concentrations above the EU threshold of 0.02 mg/kg were established in 5 samples from sheep's milk (min 0.0036 mg/kg; max 0.077 mg/kg), as well as in the goat's milk (0.052 mg/kg), produced in the Chiprovtsi mining area. As the studied grass samples from the grazing areas were not rich in Pb, other paths of lead transfer to the milk should be suggested. Though some of the remediation measures were successful, it can be concluded that the negative environmental legacy from the mining is still present in the Ogosta River basin. Better results can be expected if all the contaminant accumulation zones and the path-ways of the pollutant dispersal in the mining affected area are taken in account when environmental recovery measures are designed.

Palaeoenvironment of the Eastern Mediterranean Miocene hominoids

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During Miocene several hominoids were living in Eastern Mediterranean (Balkans, Black Sea, Asia Minor). The known middle Miocene hominoids are *Griphopithecus alpani* and *Kenyapithecus kizili,* known the previous one from the localities of Çandir and Paşalar (Turkey) and the second from Paşalar; both localities are dated either to MN 5 or to MN 6. The late Miocene hominoids include the following taxa: a. *Ankarapithecus meteai* from the early Vallesian (MN 9) localities Sinap-12, 8A (Turkey); b. *Ouranopithecus macedoniensis* from the late Vallesian (MN 10) localities of Xirochori-1, Ravin de la Pluie and Nikiti-1 (Greece); c. *Ouranopithecus turkae,* found in the early Turolian (MN 11) locality of Çorakyerler (Turkey); d. *Udabnopithecus garedziensis* known from the latest Vallesian (MN 10) locality of Udabno I (Georgia); e. *Graecopithecus freybergi* discovered in the late Miocene locality of Pyrgos Vassilissis (Greece), and f. a single premolar is known from the middle Turolian (MN 12) locality of Chirpan (Bulgaria); the sole premolar has similarities with *O. macedoniensis*.

The faunal composition, diversity and similarity of the hominoid bearing mammal assemblages of Eastern Mediterranean are analyzed by various techniques. The faunal