

New taxa for the palaeoflora of Satovcha and Ustren (Rhodope Mtn., Bulgaria)

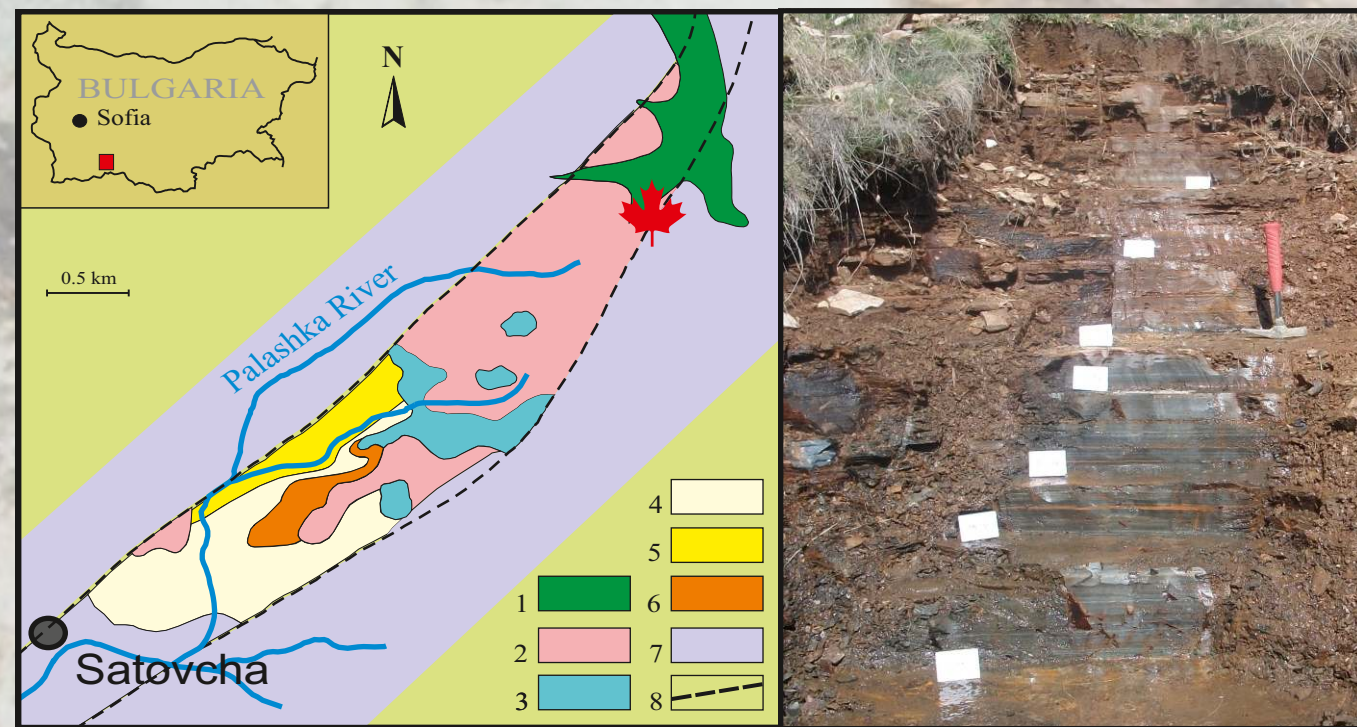


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Satovcha palaeoflora contains more than 120 species



1. Breccia and conglomerates (Quaternary); 2. Sivik Formation (Miocene); 3. Rhyolites and Rhyodacites (Oligocene); 4. Satovcha Formation (Oligocene); 5. Stamatitsa Member of Satovcha Formation (Sands); 6. Palashka Member of Satovcha Formation; 7. Bedding of Satovcha Formation (Proterozoic metamorphic rocks); 8. Faults (after Vatshev & Pirumova, 1983).



The leaf lamina of the fossil material has very similar morphological features to those of the recent species *Lithocarpus uvariifolius* and especially to its variation *L. uvariifolius* var. *ellipticus* (Metcalfe) Huang et Chang. This is the reason why we determine the fossil material in this way and accept the indicated recent species as its NLR. The distribution of this species covers SE China: SW Fujian, N and NE Guangdong, Guangxi. It forms broadleaved evergreen forest, or in association with *Castanopsis/Quercus* (subgenus *Cyclobalanopsis*) or *Pinus massoniana* Lamb. on dry, hilly areas between 200 and 1000 m.a.s.l. (eFloras, 2008a). The genus *Lithocarpus* is present in the Bulgarian paleoflora by three taxa, two of which are registered in the Rhodope region. The stratigraphic range of these taxa covers the Upper Eocene-Middle Miocene (Palamarev et al., 2005).



The genus *Oreopanax* is known in the Bulgarian paleoflora from the same locality. The new taxon differs from the already published species *O. protomulticaulis* (Rasky) Hahly (Bozukov, 2000) by the shape of the leaf lamina, and the entire leaf margin. The new fossil material has very similar morphological structure of the leaf lamina to those of the recent species *O. anomalus* M.J. Cannon et Cannon. This is the reason why we determine the fossil material in this way and accept the indicated recent species as its NLR. *O. anomalus* is a tropical species native to Costa Rica (Central America).

Conclusions

The study of each local paleoflora should not be limited in time. This study shows that both well-studied and poorly studied macroflora deposits can provide additional information in new research on them. Of course, it should be expected that new taxa are more likely to be found in poorly studied paleoflora, as are the results of the present study. The new data will primarily enrich the composition of the paleoflora, but at the same time will bring more information about the ecological conditions under which it existed. For example, information on the presence of biotopes with different ecological parameters in the vicinity of the plant deposition basin. It is also possible to get a clearer picture of the migration of individual taxa and the changes of flora and vegetation in paleogeographical aspect.

Abstract

Six new taxa for the Bulgarian paleoflora are presented. The paleobotanical material was obtained during field activities funded by the Regional Natural History Museum – Plovdiv in 2019. Four taxa are represented from the early Oligocene flora of Ustren (E Rhodope Mtn.). The new taxa established here are *Bauhinia* aff. *khassiana* Baker, *Juncus* sp., *Laurophyllum heeri* (Ettings.) Nemejc & Knobloch and *Vaccinium acheronticum* Unger. The nearest living relatives (NLR) of these taxa are of different geographical origin. The recent species *Bauhinia khassiana* Baker is distributed in SE Asia while NLR of *Laurophyllum heeri* and *Vaccinium acheronticum*, respectively *Nectandra oppositifolia* Nees et Mart. and *Vaccinium stamineum* L. are distributed in the Americas. The first one in tropical S America and the second – mainly in subtropical N America. Genus *Juncus* has a cosmopolitan distribution. The taxa *Lithocarpus* aff. *uvariifolius* (Hance) Rehder and *Oreopanax* aff. *anomalus* M.J. Cannon et Cannon have been identified from the middle Miocene flora of Satovcha (W Rhodope Mtn.). The recent species *Lithocarpus uvariifolius* (Hance) Rehder is distributed in areas of SE Asia characterized by a subtropical climate while *Oreopanax anomalus* M.J. Cannon et Cannon is a tropical endemic species for Costa Rica (Central America).



Vaccinium acheronticum Unger
V. stamineum L.
mainly in subtropical N America

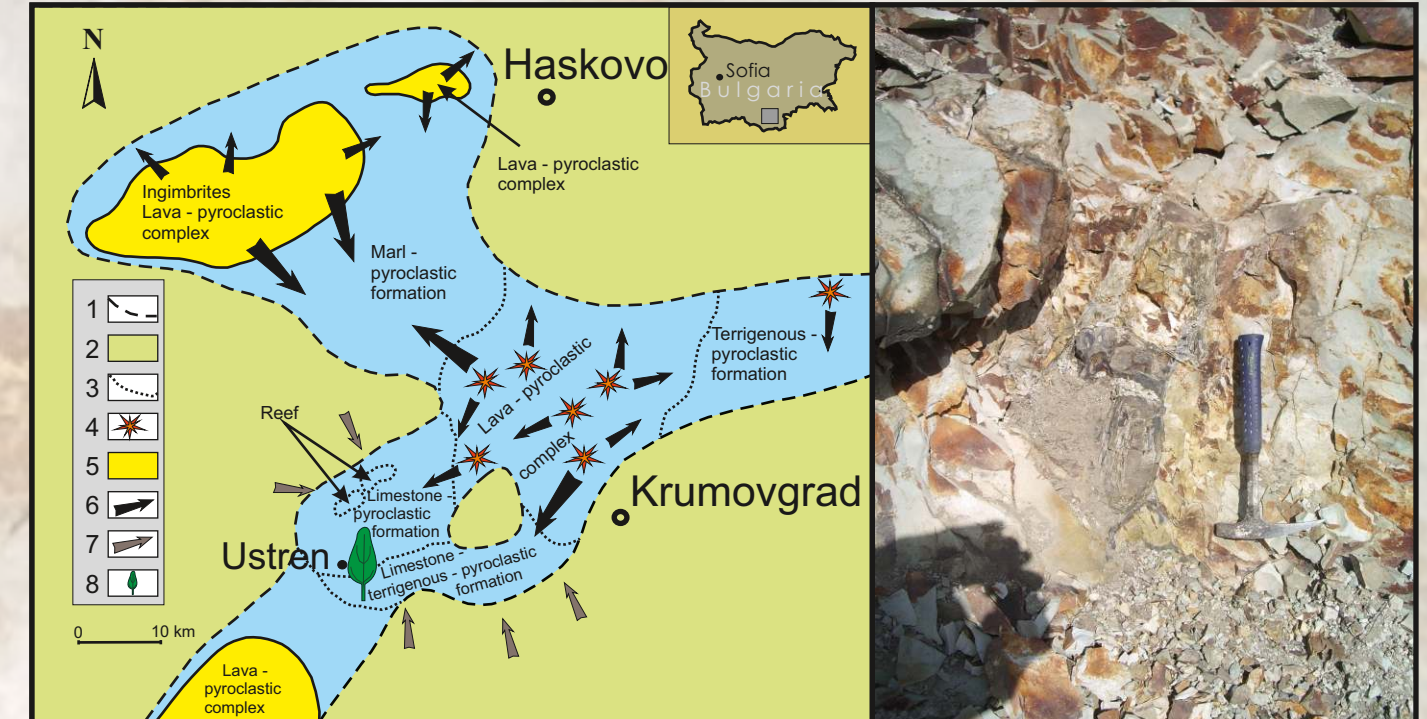
Palamarev (1964) reported the species *V. acheronticum* in the Middle Miocene flora from Chukurovo, which was subsequently revised as *Anagyris foetida* L. foss. (Palamarev & Petkova, 1987). In this situation, our find is the first for the Bulgarian paleoflora. According to Grangeon (1958) the stratigraphic distribution of the species covers Lower - Upper Miocene. The same author accepted the recent species *V. stamineum* L. as the most adequate for NLR of the fossil species mentioned here. *V. stamineum* is native to America, including Ontario, the eastern and central United States, and parts of Mexico. It is most common in the southeastern United States. This plant usually grows in dry, rocky habitat types in forests and fields, but it sometimes occurs in moist areas such as bogs and swamps (Hill, 2002). This is probably the reason the species to be quite variable in its morphology.



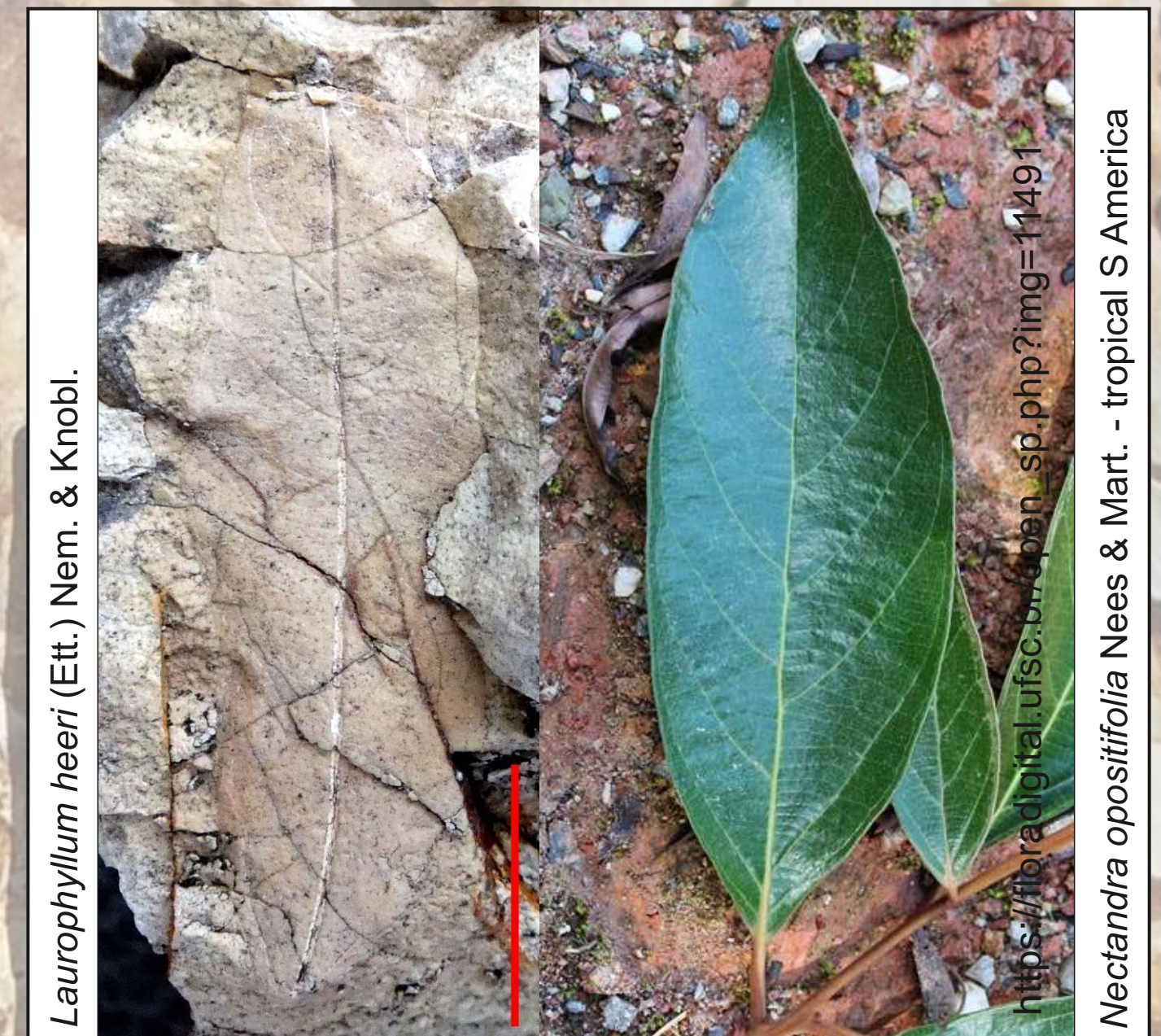
Bauhinia aff. *khassiana* Baker
B. khasiana Baker - SE Asia

The preserved part of the fossil leaf lamina has very similar morphological features to those of the recent species *B. khasiana* and especially to its variation *B. khasiana* var. *khassiana*. This is the reason why we determine the fossil material in this way and accept the indicated recent species as its NLR. The species is distributed in mixed forests in SE China (Hainan Province), India, Laos, N Thailand, Vietnam (eFloras, 2008b). The Genus *Bauhinia* is new for the Bulgarian macropaleoflora.

Ustren palaeoflora contains about 30 species



1. Probable basin boundary; 2. Land; 3. Probable boundary between facial zones; 4. Volcanic centres; 5. Caldera; 6. Probable direction of an active volcanogenic source province; 7. Probable direction of an active terrigenous source province; 8. Palaeoflora locality (after Boyanov & Goranov, 2001).



The fossil species is found close to Bulgarian geographical and stratigraphical location. It is described in the early Miocene flora of the Zagubica Basin (Serbia) (Lazarevic & Miličević, 2010). Nemejc & Knobloch (1973) consider *Nectandra oppositifolia* Nees et Mart. to be a NLR of this fossil species. The recent species is common in the tropics of Central and South America. The genus *Laurophyllum* is represented in the Bulgarian paleoflora by eight species. *L. acutimontanum* Mai is established by leaf imprint only. The rest are described by the cuticle. The stratigraphic distribution of these eight species covers the range from Upper Eocene to Upper Dacian (Palamarev et al., 2005).

The red measuring bar on the fossil photographs corresponds to 1 cm.



Juncus sp. *J. effusus* L. - approximately cosmopolitan

So far, the genus *Juncus* has been registered in the Bulgarian macropaleoflora only by fossil seeds material (Uzunova, 2001). Traces of other plant parts of the genus are expected as it is cosmopolitan.

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