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Güvem: an exceptionally rich early Miocene Macro-Flora from Central Anatolia and its Importance for Understanding Landscape Evolution in the Neogene

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Objectives: Opinions about landscape development in Turkey in the course of the Neogene are highly controversial. A whole range of pre-dominating landscapes have been advocated, including grass-dominated savannahs, light forests, and densely forested landscapes. Most palaeobotanical studies in Turkey are based on pollen and spores; macro-fossils have only rarely been investigated. The objectives of the present work are two-fold. First, we will demonstrate the importance of macro-fossils to complement evidence from the fields of palynology and palaeozoology. Second, we will provide alternative explanations to reconcile seemingly contradictory evidence from different palaeontological disciplines.

Materials and Methods: About 2000 plant macro-fossils belonging to more than 80 species from lower Miocene intra-basaltic sediments of the Güvem area, north-western central Anatolia, were studied in the plant fossil collections of the UCMP, Berkeley, California. Based on comparative morphological studies the biogeographic and taxonomic affinities of fossil plants were established. Whenever possible, fossil plant taxa were put into a phylogenetic framework.

Results: Plant fossil evidence strongly points to the presence of complex landscapes comprising wet-lands and surrounding riparian forests, light forests dominated by evergreen oaks, laurel forests, and montane forests of a distinct temperate character (Fagus, Tilia, Cathaya). Biogeographically, links are both to North America, East Asia, and Macaronesia.

Conclusion: Our study suggests that complex landscape models are more realistic than the ‘single-vegetation type’ landscape models proposed earlier for the Miocene of Turkey. This has important implications for younger Miocene and Pliocene landscape reconstructions in which early hominoids, and large mammals that are today typical of open landscapes, played important roles. Complex landscape models taking into account uplift of mountain ranges, volcanism, sea-level fluctuations, and the gradual disintegration of the Paratethys are likely to accommodate features such as large grazing mammals and closed temperate forests.

Key words: Neogene; complex landscapes; Paratethys; plant fossils; sea-level fluctuations; Turkey

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