

# SOME REPRESENTATIVES OF ANACARDIACEAE AND APOCYNACEAE IN THE PALAEOGENE FLORAS OF WESTERN KAZAKHSTAN, U.S.S.R.

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## ABSTRACT

The genera *Rhus* L. (Anacardiaceae) and *Echitonium* Ung. (Apocynaceae) are important elements of the Eocene floras of Western Kazakhstan. In the Palaeocene and Oligocene floras they are found more rarely. They refer to xerophilous plant groups of the Mediterranean type. The following species are described: *Rhus enbekshiensis* sp. nov. (similar to the recent *R. coriaria* L.), *R. minutifolia* sp. nov. (similar to the recent *R. potentillaefolia* Turcz.), *Echitonium sophiae* O. Web., *E. ashczisaicum* sp. nov. (similar to the recent species *Aganosma marginata* G. Don).

## INTRODUCTION

THE data on the finds of leaf imprints of the representatives of *Rhus* L. and *Echitonium* Ung. in the Palaeogene deposits of Western Kazakhstan are rather rarely encountered in literature. Kornilova (1956) reported the find of *Rhus quercifolia* Goepf. However, it is known that this species was later (Iljinskaya, 1968) referred to the genus *Acer*. The other species *Rhus turcomanica* (Krysht.) Korov. was mentioned in the paper by Kornilova (1950) where the period of existence of the species was determined from the late Eocene to the middle Oligocene. The data on *Echitonium michelii* Walt. from the late Eocene of Kazakhstan (lake Takyr-sor) are given by Budantsev (1953). The early-late Eocene of Kazakhstan is also characterized by the presence of *Echitonium sezannense* Watel. (Kornilova, 1966; Makulbekov, 1972). The most frequent species of *Echitonium* in the Eocene floras of Kazakhstan is *E. sophiae* O. Web. It was described by Budantsev (1957), Kornilova (1955a, b), and Kornilova and Salmenova (1958). As far as it is known, the representatives of the genera *Rhus* and *Echitonium* were physiologically typical representatives of xerophilous hard-leaved plant associations of the Eocene time in Western Kazakhstan, referring to the Mediterranean groups of the type shibljak, gariga and frigana.

Below is described the material collected from three localities of Western Kazakhstan.

## DESCRIPTION

Family — ANACARDIACEAE Lindl.

Genus — *Rhus* L.

*Rhus enbekshiensis* sp. nov.

Pl. 1, figs. 1-2; Text-fig. 1

1961 *Rhus enbekshiensis* Ig. Vassil, in: Boitzova, Vassiljev & Ovetschkin, p. 48, *nom. nud.*

*Material* — There are leaf impression and counterpart in the collection. An entire leaf is preserved on the impression, in some places the margins are damaged. The details of venation, shown in the figure, are easily distinguished with the help of the magnifying glass. The venation is still better seen on the counterpart which represents the middle part of the leaf. As far as it can be judged by the available specimens, the leaf consistency was dense, their surface was glossy and covered by a waxy coating.

*Diagnosis* — The leaves are oblong-lanceolate, 4-5 cm in length and 1-2 cm in width, coriaceous, with a somewhat rounded base, irregularly serrate-dentate along the margin. The middle vein is very well expressed; the veins of the second order are very thin and poorly visible, they branch off from the middle one, spaced at 2-3 mm from each other at the angle of 40-50°, they are sinuous, somewhat arcuately curving upwards, bifurcating and entering the dents at the ends; the veins of the third order form a very fine, dense network with convex cells at the upper surface of the leaf.

*Holotype* — NN 184/8032, 185/8032 (impression & counterpart); the Central Research Museum of Geological Prospecting named after F.N. Chernyshiov (CRMGP), Leningrad.

*Locality* — USSR, Kazakhstan, the Turgai region, the right bank of the Zhaman-Kaindy River (the right tributary of the Kara-Turgai River), near the Enbekshi winter lodge; collected by the author.

*Age & Stratigraphic Position* — The late Eocene (the early Oligocene?); yellow clays of the Saryin suite.

*Origin of Name* — Named after the Enbekshi winter lodge, near which the imprints were found.

*Comparison* — The genus *Rhus* L. is rather polymorphous; the diversity of the shape, dentation and venation of the leaves of its representatives are infinite. That is why the distinguishing of new species found in the fossil state is always connected with difficulties. *Rhus enbekshiensis* is rather similar to *Rhus turkomanica* (Krysh.) Korov., however, it is characterized by a comparatively greater leaf length and weakly visible veins of the second order. Of the living species, *R. enbekshiensis* is similar to the European species *R. coriaria* L. and *R. viminalis* Vahl. It differs from the latter by its dentate leaves (*R. viminalis* Vahl. has entire-margined leaves), however, the leaf shape and the venation type are very similar. It differs from *R. coriaria* L. by smaller and frequent leaf dents.

*Rhus minutifolia* sp. nov.

Pl. 1, figs. 3-8; Text-fig. 2

1961 *Rhus minutifolia* Ig. Vassil., in: Boitzova, Vassiljev & Ovetschkin, p. 48, *nom. nud.*

*Material* — There are some imprints of rather good preservation in the collection which give an idea of the general shape and dentation character of the leaves of the species.

*Diagnosis* — The leaflets (apparently of a pinnate leaf) are small, 0.5-1.5 cm long and 0.3-0.4 cm wide, lanceolate, with an acuminate apex and a rounded leaf base, apparently sessile or with a very short leaf stalk; there are 5-10 dents on each side, they are rounded, sometimes slightly acuminate, oriented upwards; the middle vein is well-

distinguished; the veins of the second order are fine, weakly discernible, opposite, somewhat sinuous, weakly branching, entering the dent apex; their number is equal to that of the dents.

*Holotype* — N 191/8032, syntypes NN 186/8032, 187/8032, 188/8032, 189/8032, 190/8032; CRMGP, Leningrad.

*Locality* — USSR, Kazakhstan, the Turgai region, the right bank of the Zhaman-Kaindy River (the right tributary of the Kara-Turgai River) near the Enbekshi winter lodge; collected by the author.

*Age & Stratigraphic Position* — The late Eocene (the early Oligocene?); yellow clays of the Saryin suite.

*Comparison* — *R. minutifolia* is characterized by a small size of leaves and relatively large number of dents. It is similar to the species *R. minutissima* Sap., *R. gracilis* Sap. and *R. minuta* Sap. (the Oligocene of France) which, however, have only 2-3 dents on each side of the leaflet. Of the recent species *R. minutifolia* is similar to the Mexican species *R. potentillaefolia* Turcz.

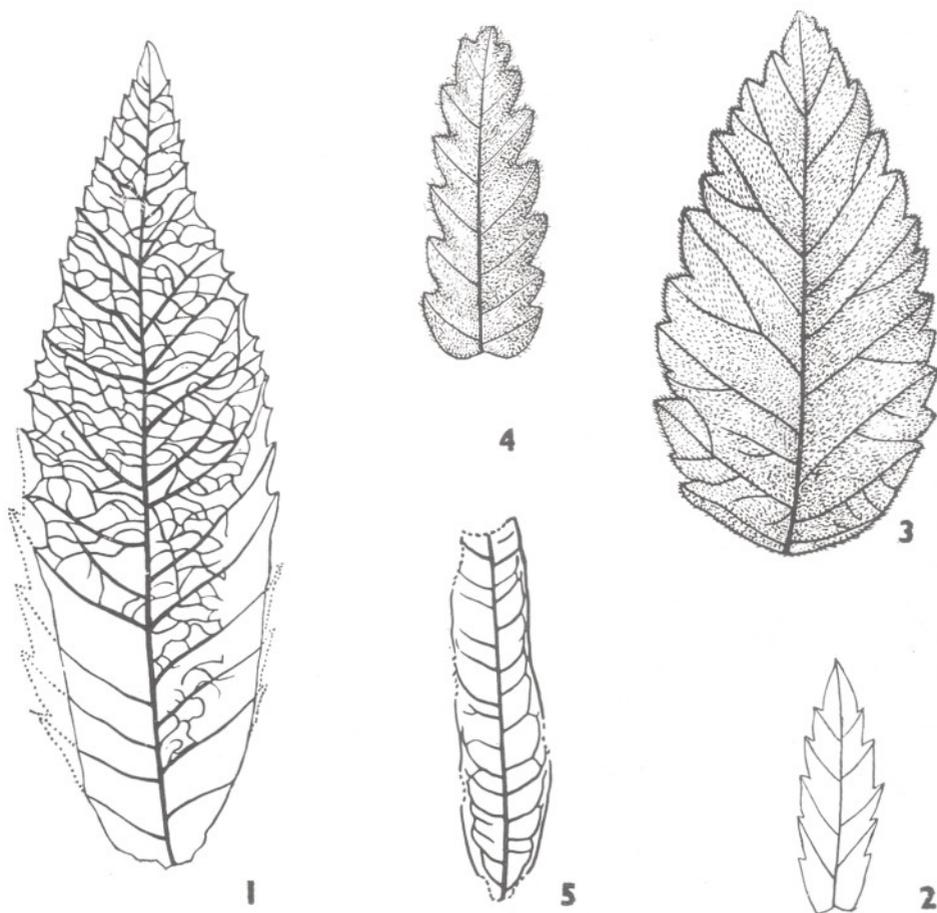
Family — APOCYNACEAE Juss.

Genus — *Echitonium* Unger, 1840

*Type Species* — *Echitonium superates* Ung.

*Diagnosis* — The leaves are narrow, oblong-lanceolate, smooth-margined, coriaceous, often having turned up margins. The veins of the second order branch off almost at a right angle, near the margin they are abruptly turned upwards and often form loops, sometimes forming almost a continuous marginal vein. The veins of the third order form a composite polygonal network.

*Comparison* — The genus is established on the basis of leaf impressions as well as on the basis of fruit and seed remains. It is quite similar to the genus *Echites* P. Br., the representatives of which inhabit Brazil and India (*E. lucida* Wal.). It is named after this genus. It is also similar to the genera *Cabucala* Pichon and *Aganosma* G. Don as regards the angle at which the veins branch off, the frequency of veins of the second order and the formation of marginal loops which are confluent and similar to a marginal vein. The difference lies for the most part in the greater narrowness of leaves and in their gradually acuminating apices (the



TEXT-FIGS. 1-5.

leaves of *Aganosma* and *Cabucala* are abruptly narrowed to a pointed apex).

*Composition & Distribution of the Genus* — The genus includes 5-6 species. The Palaeocene-Miocene of Western Europe, Greenland, North and Central America; the Eocene of the Ukraine, and the Southern Urals, Palaeocene-Oligocene of Western Kazakhstan.

*Echitonium sophiae* O. Web.

Pl. 1, figs. 9-11

1852 *Echitonium sophiae* O. Web., p. 187, pl. 120, fig. 17a, b.

1859 *Echitonium sophiae* O. Web.-O. Heer, p. 22, Taf. CIV, fig. 10.

*Material* — The collection numbers about 15 leaf impressions of this species; three of the

specimens are illustrated here NN 284/10689, 285/10689, 285a/10689.

*Diagnosis* — The leaves are linear, gradually tapering from both ends, coriaceous, with turned-up margins, 6-10 cm long, 0.7-1.0 cm wide. The venation is pinnate; there are 14-20 veins of the second order, they branch off from the middle one at an angle of 70-80°, curve somewhat arcuate and reach the margin forming loops which are not always distinctly seen on the impressions because of the turned-up margin.

*Lectotype* — O. Weber, 1852, pl. 20, fig. 17a; the Aquitanian of the Rhine region (Rott).

*Locality* — USSR, Kazakhstan, the Aktyubinsk region, the western slope of the Mugodzharly mountains, the right bank of the Tyk-

butak River in 8.5 km from the place where it falls into the Or River; collected by R. A. Segedin.

*Age & Stratigraphic Position* — The early Eocene (the late Palaeocene?), green glauconitic sandstones of the Tykbutak suite.

*Distribution* — Oligocene-Miocene of Western Europe. In Kazakhstan is characteristic of the Eocene, but is also found in the late Palaeocene, becoming extinct at the boundary of the Oligocene.

*Comparison* — The imprints from the Mugodzhary region are very similar to the type material cited in the paper by Weber (1852). This similarity is reflected both in the shape of leaves and in very weakly discernible venation. Apparently, the leaves were very tomentose which obscured the convexity of the veins. However, it is seen that the veins of the second order branch off from the middle (median) one at a relatively acute angle (70°).

The genus *Echitonium* is rather monotypic, therefore its species are similar to each other. But their features are rather distinct so that they might be easily distinguished. Thus, the species *E. michelotii* Wat. and *E. sezannense* Wat. differ from *E. sophiae*: the former by even more narrow and more oblong leaves, and the latter by large leaves and widely spaced veins of the second order. Sometimes it is compared with *E. cuspidatum* Heer, but only in case when it is based on pl. 2, fig. 2 from the paper by Saporta (1863). If we turn to the figures published by Heer (1859) it will never occur to anybody to compare them, they differ much from *E. sophiae*; the leaves of *E. cuspidatum* are much larger and relatively wider.

*Echitonium ashczisaicum* sp. nov.

Pl. 1, fig. 12; Text-fig. 5

*Material* — One impression of almost a complete leaf.

*Diagnosis* — The leaves are 5-6 cm long, 1-1.5 cm wide, oblong-lanceolate shape with a rounded wedge-shaped base. There are about 15 pairs of veins of the second order; they branch off at an angle of 80° and reaching the margin, abruptly curve upwards and are confluent with the neighbouring ones, forming loops which join into one marginal vein.

*Holotype* — N 286/10689, CRMGP, Leningrad.

*Locality* — USSR, the Aktyubinsk region, the western slope of the Mugodzhary mountains; the interfluvium of the Kundyzy and Ashczisai rivers to the south-east of the Karakolskij Village; collected by R. A. Segedin.

*Age & Stratigraphic Position* — The later part of the Middle Oligocene; the brown ferruginous sandstone of the Kundyzy suite.

*Comparison* — It is most of all similar to *E. sophiae* O. Web., but is easily distinguished from it due to its smaller length and greater width, as well as by rounded wedge-shaped leaf base. It also differs by a somewhat angle of branching-off of the veins of the second order. It is similar to the recent species *Aganosma marginata* G. Don (Apocynaceae), differing by somewhat narrower leaves and greater number of veins of the second order.

#### ACKNOWLEDGEMENT

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#### REFERENCES

- BOITZOVA, E. P., VASSILJEV, I. V. & OVETSCHKIN, N. K. (1961). About borders and stratigraphical range of Oligocene in Turgai depression and adjacent regions. *Mat. VSEGEI*, **43**: 45-52 (in Russian).
- BUDANTSEV, L. JU. (1953). A new find of palm Sabal in Kazakhstan. *Trans. Acad. Sci. USSR*, **93** (2): 347-348 (in Russian).
- BUDANTSEV, L. JU. (1957). The Eocene flora of Pavlodar-Irtysh region. Volume in memory of A. N. Kryshstofovich: 177-198 (in Russian).
- ILJINSKAJA, I. A. (1968). The Neogene floras of Zakarpat'skaja region, Leningrad. (in Russian).
- KORNILOVA, V. S. (1950). Some new data to the flora of the Indricotherii beds of Turgai. *Mem. Acad. Sci. KazSSR, Ser. bot.*, **5**: 85-101 (in Russian).
- KORNILOVA, V. S. (1955a). To the characteristic of the flora of the Bolattam beds of Turgai. *Mem. Acad. Sci. KazSSR, Ser. biol.*, **9**: 3-19 (in Russian).
- KORNILOVA, V. S. (1955b). The materials to the Eocene flora of the right bank of the river Selety. *Ann. Inst. bot. Acad. Sci. KazSSR.*, **1**: 118-130 (in Russian).
- KORNILOVA, V. S. (1956). The results of the studying of the Oligocene flora of Turgai. *Ann. Inst. bot. Acad. Sci. KazSSR.*, **3**: 59-101 (in Russian).

- KORNILOVA, V. S. & SALMENOVA, K. S. (1958). A new locality of the Eocene flora in Kazakhstan-area Kulboldy. *Mat. of History of Fauna and Flora of Kazakhstan*, 2: 109-111 (in Russian).
- MAKULBEKOV, N. M. (1972). The Eocene flora of North Kazakhstan. *Alma-Ata* (in Russian).
- HEER, O. (1859). *Flora Tertiaria Helvetiae*. III. Winterthur.
- SAPORTA, G. (1863). *Études sur la végétation du sud-est de la France à l'époque tertiaire*. I. Paris.
- UNGER, F. (1840). Über die Pflanzen und Insekten-Reste von Radoboj in Kroatien. *Neues Jb. Miner. Geol.*, 1840: 347-377.
- WEBER, O. (1852). Die Tertärflora der Niederrheinischen Braunkohlenformation. *Palaeontographica*, 2: 117-285.

## EXPLANATION OF PLATE

## PLATE 1

(All the figured specimens are preserved at the Central Research Museum of Geological Prospecting named after F. N. Chernyshiov (CRMGP), Leningrad).

*Rhus enbekshiensis* sp. nov.

fl. Zhaman-Kaindy

1. Holotype — specimen N 185/8032; impression.
2. Isotype — specimen N 184/8032; counterpart. × 2.

*Rhus minutifolia* sp. nov.

fl. Zhaman-Kaindy

3. Holotype, specimen N 191/8032. × 2.
4. Syntype, specimen N 187/8032. × 3.
5. Syntype, specimen N 186/8032. × 3.
6. Syntype, specimen N 188/8032. × 3.

7. Syntype, specimen N 189/8032. × 3.
8. Syntype, specimen N 190/8032. × 3.

*Echitonium sophiae* O. Web.

fl. Tykbutak

9. Specimen N 285/10689; impression.
10. Specimen N 285a/10689; counterpart.
11. Specimen N 284/10689. × 2.5.

*Echitonium aschzisaicum* sp. nov.

fl. Kundyzy and Ashczisai

12. Holotype, specimen N 286/10689.

*Aganosma marginata* G. Don

13. Recent. Herbarium of the Komarov Botanical Institute of the Academy of Science of USSR (from Herbarium of the Royal Botanic Garden, Edinburgh).



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2



3



4



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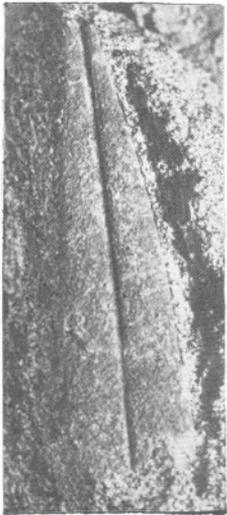
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11



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