

# ***Podozamites* AND *Swedenborgia* FROM THE LOWER CRETACEOUS OF TRANSBAIKALIA**

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**Abstract:** *Swedenborgia* is reported for the first time from the Lower Cretaceous of Russia. Late Mesozoic representatives of this genus, known primarily from Early Mesozoic floras, associate with *Podozamites* leaves. New species of *Podozamites* and *Swedenborgia* are described.

**Key words:** *Swedenborgia*; *Podozamites*; Lower Cretaceous; Transbaikalia.

*Swedenborgia* впервые обнаружена в нижнемеловых отложениях России. Поздемезозойские представители этого рода, более широко распространенного в раннем мезозое, встречаются совместно с листьями подозамитов. Описаны новые виды подозамитов и сведенборгий.

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Fossil plants have been collected from the Baisa locality on the Vitim River, Transbaikalia, by V. A. Krassilov and the author [1, 2, 7, 8]. New species of proangiosperms and angiosperms have been described from this locality [7, 8, 10]. Dominant in all the plant-bearing beds are *Podozamites* leaves and their associating *Swedenborgia* cone scales. At least two species of *Podozamites* differ in leaf shape and cuticular characters.

The author collected additional material from the Lower Cretaceous of Goosinoserskaya Depression with V. A. Krassilov in 1985, and from the Bukachacha coal mine with H. G. Yadrishenskaya in 1987. In both localities, *Podozamites* was found with *Swedenborgia* scales. These support the earlier suggestion (Krassilov 1982) that *Podozamites-Swedenborgia* plants were not restricted to the Early Mesozoic but, at least in central Asia, survived as a dominant floristic element through the Late Mesozoic.

**Genus *Podozamites* F. Braun, 1843**

***Podozamites baissicus* Bugdaeva, sp. nov.**

Fig. 1a-f

**Name.** After the Baisa locality.

**Holotype.** Institute of Biology and Pedology, No. 31/280, western Transbaikalia, left bank of the Vitim River, upstream of the Baisa Creek mouth, Lower Cretaceous, Zaza Formation, bed 31; fig. 1a.

**Description.** Leafy shoots have an axis 1-3 mm, typically 1.5 mm, thick. Leaves are helically arranged, elongate, 28-60 mm long, 3-4 mm of maximal width in the middle. Base is tapered, apex narrowly pointed, and veins are from 5-6 to 11-12, about 2-3 per 1 mm, ending in the apex.

The cuticle is very thin and hypostomatic. Upper cuticle shows the filed rectangular cells with thin straight anticlinal walls. Costal cells,  $28-38 \times 72-170 \mu\text{m}$ , are aligned in 5-6 files and are longer than the intercostal cells; the latter are squarish, about  $33-38 \times 38 \mu\text{m}$ . Occasional papillae and hair bases are in groups of 3-5 in the costal zones.

Lower cuticle shows costal zones of elongate cells in 4-5 files. The cells are rectangular elongate,  $55-226 \times 22-38 \mu\text{m}$ . Intercostal zones include about 7 files of squarish cells,  $28-44 \times \mu\text{m}$ . Stomata are small, abundant, transverse or oblique, and occasionally longitudinal. Guard cells are slightly sunken,  $27.5-28 \times 22 \mu\text{m}$ , fabiform, with T-shaped polar thickenings. Subsidiary cells number 4-5.

**Comparison.** The leaves resemble *Podozamites angustifolius* and *P. gramineus*, but differ from them in acutely pointed apex. The cuticular structure is the same type as in *P. aff. eichwaldii* from the Bureya Basin [3] and *P. ex gr. lanceolatus* from Primor'ye [5], but the stomata are occasionally longitudinal and differ also in the polar thickenings.

**Material.** Five leafy shoots and several detached leaves from the Baisa locality.

#### *Podozamites* spp.

Fig. 1g-i

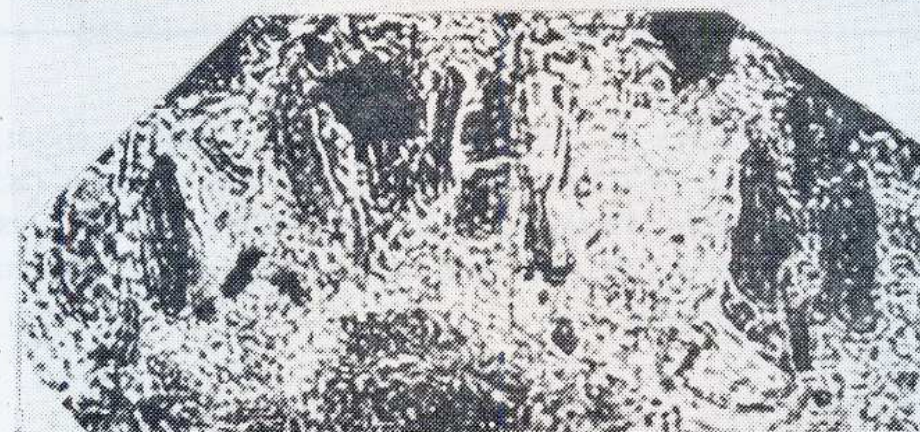
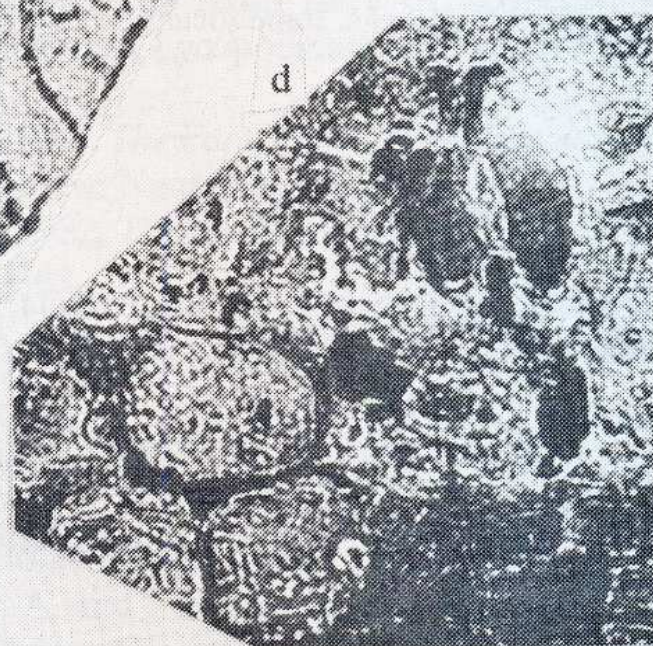
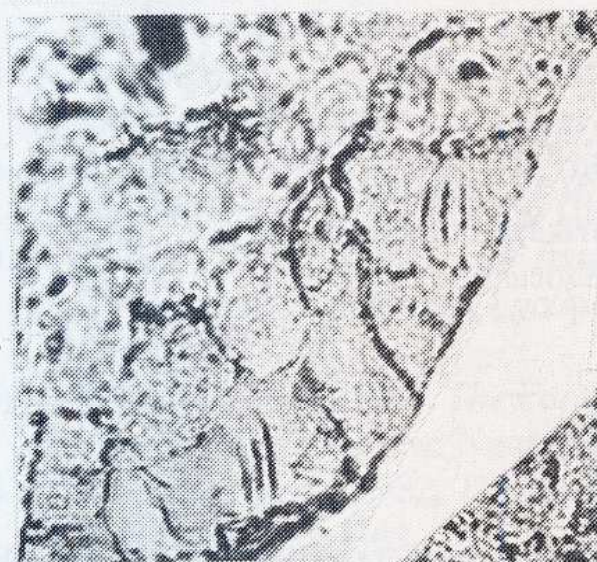
In the Baisa locality are leafy shoots with apically rounded leaves (fig. 1g) quite different from *P. baissicus*, described above. The leaves are 30-50 mm wide with about 32 veins. The marginal veins end in the leaf margin, not reaching to the apex. Celloidin replicas show costal and intercostal zones, the latter with transverse or oblique stomata the details of which are not discernible.

Shoots in figure 1h are from the Lower Cretaceous coal-bearing beds of Goosinoserskaya Depression where they occur with *Swedenborgia*. They are up to 60 mm wide, with 16 veins. Figure 1i shows dispersed *Podozamites*-type cuticles, obtained by bulk maceration from the Bukachacha coal beds, and which contain *Swedenborgia* scales. On the scanty cuticular evidence, all these leaves belong to *Podozamites* rather than the morphologically similar *Leptophyllum*.

#### Genus *Swedenborgia* Nathorst, 1878

#### *Swedenborgia transbaikalica* Bugdaeva, sp. nov.

Fig. 2a-d



g

b

h

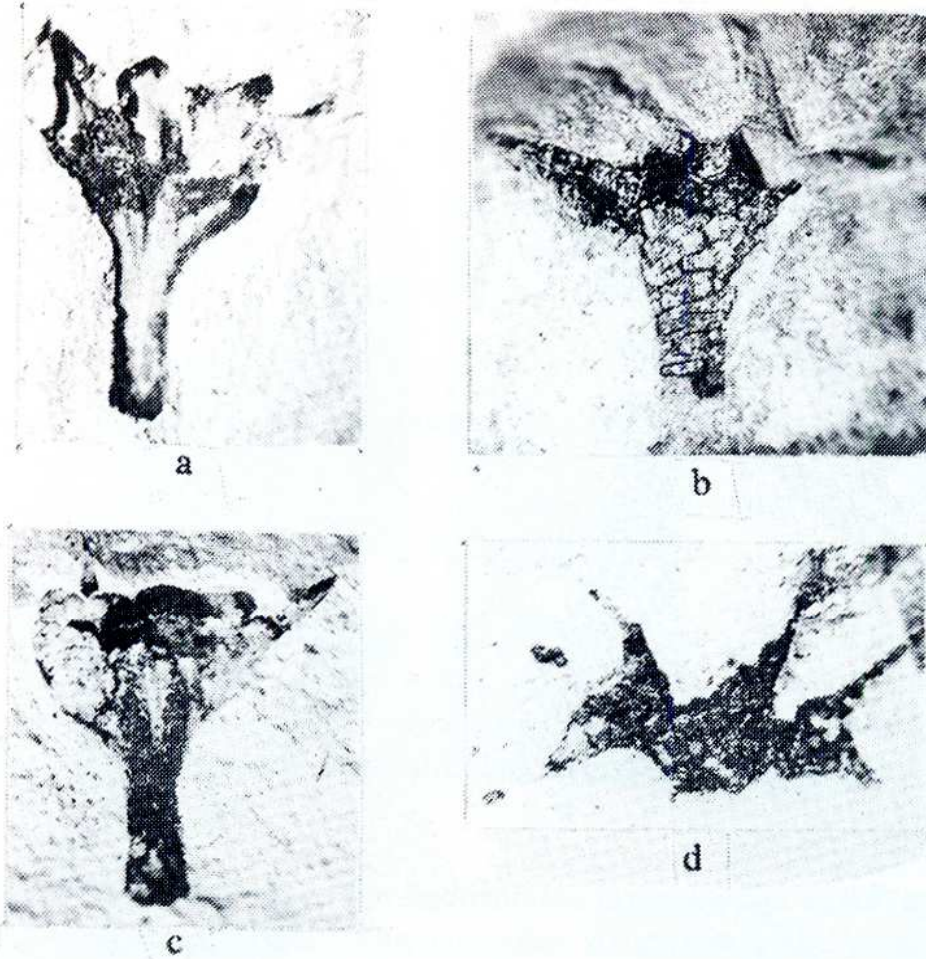


Fig. 2. *Swedenborgia transbaikalica* sp. nov.: *a, b* - cone scales showing seed scars, No. 31/14, 31/17, Baisa, ( $\times 5$ ); *c* - holotype, No. P-46/44, Goosinoserskaya Formation, ( $\times 5$ ); *d* - distal part of scale, same locality, ( $\times 5$ ).

**Name.** After Transbaikalia Province.

**Holotype.** Institute of Biology and Pedology, No. P-46/44, Western Transbaikalia, Goosinoserskaya Depression, Lower Cretaceous, Selengin Formation; figure 2*c*.

**Description.** Cone scales consist of a stalk 3-5 mm long, 1.5-1.7 mm wide, distally expanding into a digitate portion that shows a small triangular bract distinct from the much larger 5-lobed seed scale. The lobes of the latter are narrow, acuminate, curved, and 3.5-4 mm wide.

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Fig. 1 *a-f*. *Podozamites baissicus* sp. nov., Baisa locality: *a* - holotype, No. 31/280, ( $\times 1$ ); *b* - shoot, No. 31/192, ( $\times 1$ ); *c* - upper cuticle showing two hair bases, ( $\times 315$ ); *d-f* - lower cuticles with stomata, ( $\times 500$ ); *g* - *Podozamites* sp., No. 31/348, Baisa locality, ( $\times 1$ ); *h* - *Podozamites* sp., No. T-2/83, Goosinoserskaya Depression, ( $\times 1$ ); *i* - *Podozamites* sp., dispersed lower cuticle from coal-bearing deposits of Bukachacha mine, ( $\times 320$ ).

These scales are found in three successive plant beds of the Selengin Formation occurring in each with *Podozamites* leaves.

**Comparison.** These cone scales belong to the 5-lobed group that includes *S. cryptomerioides* Nath., *S. longiloba* Stanisl., *S. major* Harris and *S. minor* Harris [4, 9]. They differ from *S. cryptomerioides* in the longer and narrower lobes of the seed scales. *S. longiloba* is much larger with needle-like lobes which can be fused to various extents. *S. major* and *S. minor* differ in dimensions and proportionally shorter lobes.

*Swedenborgia* sp. from the Lower Cretaceous of Mongolia [6] is fairly similar and perhaps conspecific to the Transbaikalian cone scales.

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