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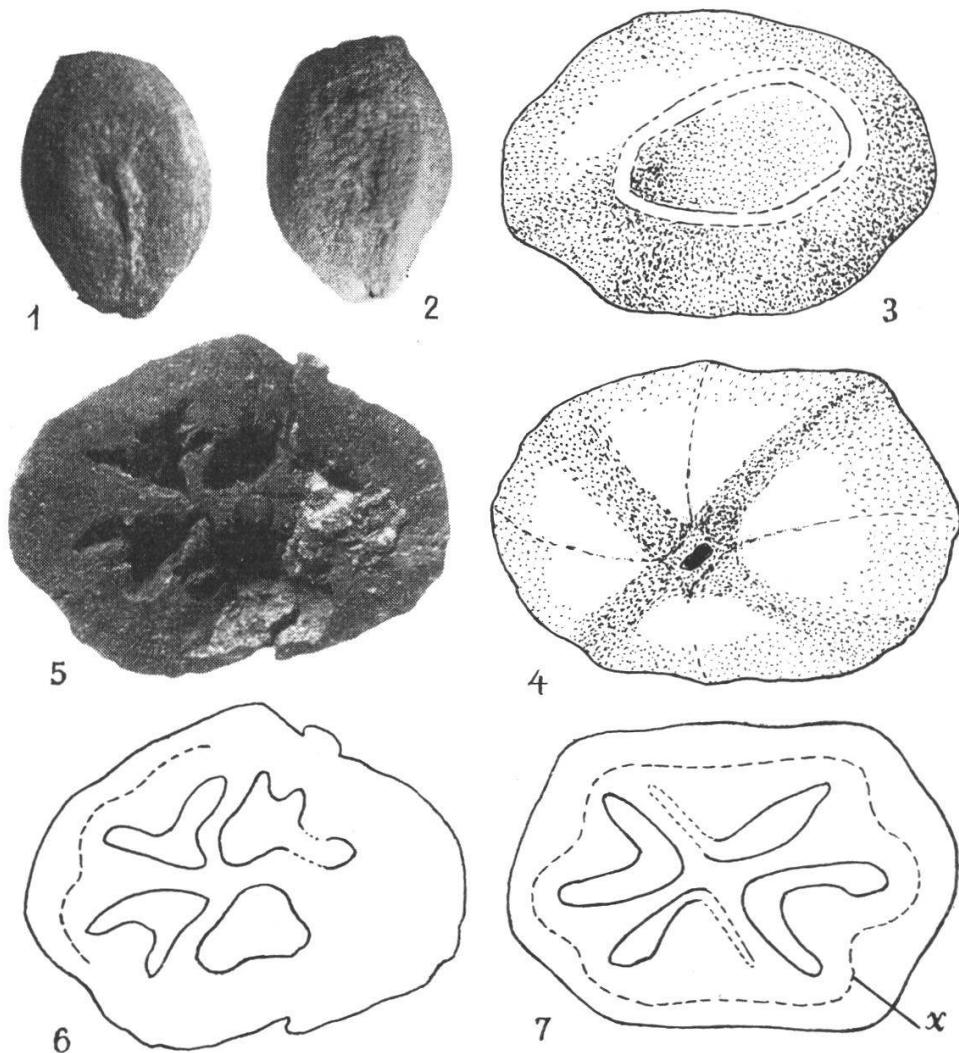
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## The Genus *Sphaenotheca* KIRCHHEIMER in the Lower Pliocene of the Carpathian Mountains

Von WLADYSLAW SZAFER

The family *Symplocaceae* is represented in the recent flora of the earth by the genus *Symplocos* including about 400 species. These are trees or shrubs with evergreen or deciduous leaves. The geographic ranges of almost all of these species lie in the tropical zone in Asia as well as in America; only a few cross the parallel 31° of the northern



*Sphaenotheca carpatica* n. sp.

1 and 2. The fruit.  $\times$  ca. 3,5. 3. The fruit seen from above with the flattening on the top.  $\times$  ca. 10. 4. The basis of the fruit with four carpels and the traces of the vascular bundle. 5. The cross-section of the fruit, with four horse-shoe shaped seed chambers, on the right side somewhat damaged and split.  $\times$  ca. 10. 6. The same fruit. 7. The same from the cross-section situated a little higher. The broken line (x) in the figures 6 and 7 indicates the border between the exo- and endocarp.

and southern latitude. Except for one American species they avoid warm and humid lowland situations and preferably occupy the lower mountain zones from 700 to 1500 m. In the mountains of the Indo-Malayan area the species of the genus *Symplocos* often live together with the genus *Mastixia* (*Cornaceae*) with which it also occurs in fossil state in the Tertiary of Europe. Some *Symplocos* species may be now successfully cultivated in central and even in northern Europe, e. g. the east-Asiatic *Symplocos Crataegoides*.

The above data have been quoted here after KIRCHHEIMER (1957) whose great merit is that in a number of papers he has submitted a thorough study of the family *Symplocaceae* and the sub-family *Mastixioideae* of the family *Cornaceae* in the Tertiary of Europe. Sometimes a mass occurrence of the representatives of both these taxonomic groups of woody plants is one of the peculiarities characteristic of the older Tertiary, especially in Germany. They are much more rarely met with in Poland.

According to KIRCHHEIMER, fifteen species of the genus *Symplocos* of the family *Symplocaceae* are hitherto known in Europe occurring throughout the Oligocene to the Pliocene, and three extinct genera: *Durania* KIRCHHEIMER (1935), *Palioporia* KIRCHHEIMER (1934) and *Sphaenotheca* KIRCHHEIMER (1934).

Of the extinct genus *Sphaenotheca* two species have been described by KIRCHHEIMER: *Sphaenotheca gigantea* KIRCHHEIMER (1935) hitherto known from the Oligocene of Germany from Brühl, a locality lying near Köln, and *Sphaenotheca incurva* KIRCHHEIMER (1934) known from the central and upper Oligocene of Germany, on the Rhein and in Lusatia from the localities as follows: Kausche b. Spremberg, Gohra b. Senftenberg, Konzendorf b. Düren, Serysen b. Arzberg and Wiesen b. Kamenz in Saxony.

*Sphaenotheca incurva* was, according to KIRCHHEIMER, a species common in the formation of the German brown coal epoch of the younger Oligocene which became extinct «before the beginning of the Miocene in central Europe» (l. c. p. 601).

In the present record the author submits the information concerning the occurrence of the genus *Sphaenotheca* in the lower Pliocene of the Western Carpathian Mountains. It was found already in 1938 at Krościenko on the river Dunajec SZAFTER (1947) included in a rich flora at the study of which it was not taken into consideration as at that time the author was not sure of its taxonomic position.

The characters of the very hard fossil fruit are as follows: length 8.5 mm, breadth 5.5 mm, jug-like in shape, slightly assymetrical with pronounced, longish, rounded edges. The fruit is horizontally flattened at apex and slightly depressed; the edge of the flattening is provided

with a slight, roller-like thickening. No apertures were detectable on the surface of the apical flattening. The fruit is slightly rounded at base, rooved longitudinally, with discernable traces of bundles which enter the fruit at this place. When chopped transversally the fruit shows details of its structure as follows: a pronounced distinction of the very hard tissue of the fruit wall into the outer part built of larger cells and the inner part possessing smaller cells; the border between them is distinct and wavy and corresponds to the border of the exocarp and endocarp. Inside the fruit four carpels are well visible; the seed chamber of each of them shows, when dissected, a characteristic shape of a horseshoe with uneven arms wide open towards the surface of the fruit. The cuneate form of ovaries of the fruit is responsible for the name of the genus *Sphaenotheca*. In the seed chambers the presence of destroyed seeds was established. The four-carpelled fruit shows a feebly visible narrow central canal at the place of fusion, which, according to KIRCHHEIMER, forms one of the characters by which the genus *Sphaenotheca* differs from *Symplocos*, the latter possessing the central canal very distinctly developed.

The details of structure of the fossil fruit described above and represented on p. 203 prove that we have to deal here with the genus *Sphaenotheca* Kirch. and, moreover, with a species approaching *Sphaenotheca incurva* Kirch. The differences between the fossil fruit from Krościenko and the precise specific description of *S. incurva* based upon an abundant material are reduced to the details as follows:

1. The specimen from Krościenko is smaller than the smallest of all known specimens of *S. incurva*. It is only 8,5 mm long and 5,5 mm broad while the smallest specimens of *S. incurva* known heretofore are 12 mm long and 7 mm broad.
2. The roller-like thickened edge at the apex of the fruit is less distinct than in *S. incurva*.
3. The apical apertures with which the upper parts of the ovaries are connected and through which the seeds germinate in *S. incurva* are not discernable on the flattened top of the specimen from Krościenko. Possibly, our fossil fruit was not quite ripe and the apical endings of the ovary locules did not open.
4. The border between the exocarp and the endocarp seen in a cross-section is by far more distinctly marked than in *S. incurva*.

The taxonomic value of the characters mentioned above by which our fossil specimen differs from *S. incurva* is not considerable. As, however, the *Sphaenotheca* from Krościenko is the only specimen representing this genus in the younger Tertiary (lower Pliocene) deposits, and as it has not at all been hitherto found in the Miocene, it seems justified to determine it by a separate specific name, the more so as *S. incurva*

has up to the present passed for a differentiating species connected with the Oligocene. The author calls it here *Sphaenotheca carpatica* n. sp.

Considering from the point of view of historical geography of plants the fact that the genus *Sphaenotheca* approaching the Oligocene species *Sph. incurva* has been found in the lower Pliocene of central Europe, it should be acknowledged that *Sph. carpatica* is an Old Tertiary relic in the flora of the Upper Tertiary. Likewise, fairly numerous other genera and species which doubtlessly are very old historically and have survived in the mountainous area of the Carpathians longer than in other territories of central Europe, may also be so determined. The reader should be reminded that in the lower Pliocene from Krościenko old relic forms have been found, such as *Podostemonites corollatus* SZAFAER which represents an exceedingly primitive type of flower structure in the family *Podostemonaceae* SZAFAER (1952) or *Larix ligulata* SZAFAER (1947), which unites the characters of the American *L. Lyalli* PARL. and the Asiatic *L. Potanini* BAT.

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