

ART. XII.—*A Crossotheca from the Rhode Island Carboniferous*; by EDA M. ROUND.

The presence of any form of fruiting body in the Pennsylvanian is of interest, especially if it sheds light upon the evolution of seed plants. Among fossils of this class from the Rhode Island coal basin have been found specimens of a new species of *Crossotheca* named from its diminutive size *nana* and described as follows:

Crossotheca nana, n. sp.—Stirps 5 mm. latus, paniculi laxi racemorum fructuum sustinere videtur. Paniculi for minimum 5-6 cm. longi vel longiores probabiliter; secundariæ divisiones ovatas fusiformas fruges sustinent, unaquaque 3-4 mm. longa, 1-1½ mm. lataque est. Fruges maturiores inclives sunt arcuatim paullum esse, ex raceme axe super quem sustententur. Fruges longitudinales in partes tres dividuntur. Partes posteriores noviter divisae sunt et compositae oblongarum antheridium quae separatae vel ex parte conjunctae centrali parti videtur esse similis fimbriis. (Figs. 1, 2.)

Stem 5 mm. wide, bearing loose panicles of clustered fruits. Panicles at least 5-6 cm. long, probably longer; secondary divisions bearing oval fusiform fruits each 3-4 mm. long by 1-1½ mm. in diameter. In more mature forms inclined to be slightly arcuate, the more convex side being farthest from the axis of the raceme on which they are borne. The fruits appear to be divided longitudinally into three parts. The outer portions, which are again divided, are composed of oblong antheridia which are either separate or partly attached to the central part like fringe.

In seeking for evidences of the presence of *Crossotheca nana* in other parts of the world, sketches by Gutbier of specimens¹ from the Zwickau coal basin of Saxony may be cited. The raceme figured by him (see fig. 3) is suggestive of the general appearance of the Rhode Island fossil when viewed under low magnification. Gutbier, however, makes no reference to his figures but in another text speaks of them as *Sphenopteris allosaurioides*,² a name which gives an interesting sidelight upon his interpretation of the fossil and shows that he regarded it as the fertile portion of a fern closely allied to the modern cliff brake.

¹ Gutbier, A. von: Abdrücke u. Verstein. Zwickauer, Atlas, Pl. 10, figs. 4-4b, 1836.

² Reichenbach, Ludwig: in Gaea von Sachsen (Verst. Uebersachsen) 1843.

FIG. 1.



FIG. 1.—*Crossotheca nana* Round, nat. size, Pawtucket, R. I. (No. 1012 Roger Williams Park collection, Prov., R. I.)

FIG. 2.

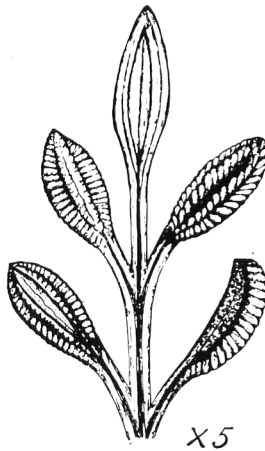


FIG. 2.—*Crossotheca nana*; detail, $\times 5$.

According to Kidston,³ *Crossotheca* fruits are not, as formerly supposed, the exannulate fertile pinnae of Pteridophytes allied to the Marattiaceae but represent microsporangiate parts of a Pteridosperm, the sterile forms of which are of the Sphenopterid or Pecopterid type.

FIG. 3.



FIG. 3.—Showing specimen as figured by Gutbier.

Three typical *Crossotheca* species from the European coal flora show noteworthy differences from the American form. *Crossotheca schatzlarensis* Stur⁴ consists of a more complex panicle than the Rhode Island specimen, the units of which are divided into four to eight antheridia as contrasted with fifteen to twenty in *Crossotheca nana*. The size of each unit, however, is about the same as that of the Rhode Island form although the proportions are very different, being loose where *Crossotheca nana* is compact. *Sphenopteris* (*Crossotheca*) *Crepini* Zeiller⁵ is about the size of the Rhode Island species but more stout in form and simple in details. *Sphenopteris* (*Cros-*

³ Kidston, R.: Phil. Trans. Roy. Soc., vol. 198B, pp. 413-445, Pls. 25-28, 1908. Les vegetaux houillers recueillis dans le Hainaut belge, p. 41, 1909.

⁴ Kidston, R.: Proc. Roy. Phys. Soc., vol. 9, Pl. 21, figs. 1-6, 1888.

⁵ Zeiller, R.: Bassin houiller de Valenciennes, Pl. 13, figs. 1-3, 1886.

<i>Crossotheca</i> .	Length of raceme.		Stem.	Inflexion, lateral raceme to main stem.		Length of lateral raceme.		Width of lateral raceme.		Length of fruit.		Width of fruit.		Antheridia each side of fruit, numbers		Length of antheridia.		Width of antheridia.		Formation.
	cm.	mm.		cm.	mm.	cm.	mm.	cm.	mm.	cm.	mm.	cm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	
1. <i>schatzlarenensis</i> *	8	3	grooved	30°	3 1/2	1	2-3	2	2-3	2	2-3	2	3/4	4-9	2	2	3/4	Middle Coal, Yorkshire, Eng.		
2. <i>Crepini</i>	7	3	striated	60°	1 1/3	1	4-5	3	1-2-1	3	1-2-1	1/3	7-16	1/2-1	1/3	1/3	Westphalian, Valenciennes, France.			
3. <i>Boulagiti</i>	?	?	finely striated	45°	3	2	12	5-6	28	2-2	1/2	1	28	2-2	1/2	1	Westphalian, Valenciennes, France.			
4. <i>nana</i> , n. sp. ...	5	2	grooved	45°	1	1/2	3	1-2	15-20	1 1/2-2	1/5	1/5	15-20	1 1/2-2	1/5	1/5	Middle Coal ? Rhode Island.			

* Cf. *Sorocladus asteroides*, Lesqx., Coal Flore, 2d Geol. Surv. Penn., Pl. 48, figs. 9-9b, 1880.

† Cf. *Sorocladus sagittatus*, Lesqx., *ibid.*, Pl. 48, figs. 10-10b.

sothea) *Boulayi* Zeiller,⁶ however, has about the same proportions as *Crossothea nana* but is about four times larger. Details of comparison of all these species are shown in the accompanying table.

Specimens of *Crossothea nana* have been found in the Pawtucket and Portsmouth sections of Rhode Island, an indication that the species was somewhat widespread in the Narragansett Basin during the Carboniferous.

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⁶ Ibid., Pl. 4, fig. 4.