

# Upper Triassic *Parasphenophyllum* (Order Sphenophyllales) from Omine, Western Japan

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## Introduction

The order Sphenophyllales are representative plants of the Upper Paleozoic age.

In the Euramerican flora they are dominant in Carboniferous and described under one genus *Sphenophyllum*, but in Cathaysia land they are diversified into four directions: non-trizygoid straight vein (*Sphenophyllum*), non-trizygoid curving vein (*Parasphenophyllum*), trizygoid straight vein (*Trizygia*) and trizygoid curving vein (*Paratrizygia*) types. They are dominant in Permian and rarely found in Upper Triassic.

ASAMA & NAITO (1978) described *Trizygia ominensis* from the Upper Triassic Momonoki Formation in the Western Japan, and it was the latest species of the Sphenophyllales in the world. In this paper the authors reported *Parasphenophyllum okafujii* n. sp. collected by Hideo ISHIDA from the Fujiyakawachi coal bed of Momonoki Formation. (see Fig. 1)

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## Classification of Sphenophyllales in Cathaysia Land

From the arrangement of leaves in a whorl and the venation of leaves, all the species described from the Cathaysia land are classified into the following four types. Four species described by GU & ZHI (1974) (asterisked) are added to ASAMA (1970).

- A. Non-trizygoid, straight vein type.....*Sphenophyllum*  
from China; *Sphenophyllum pseudotenerrimum*, *S. tenerrimum*, *S. lungtanense*, *S. verticillatum*, *S. kawasakii*, *S. cuneifolium*, *S. costae*, *E. emarginatum*, *S. grabau*, *S. trapaefolium*, *S. laterale*,\* *S. endoseidoi*, *S. rotundatum*  
from Korea; *Sphenophyllum pseudocostae*, *S. macrotruncatum*, *S. orientale*, *S.*

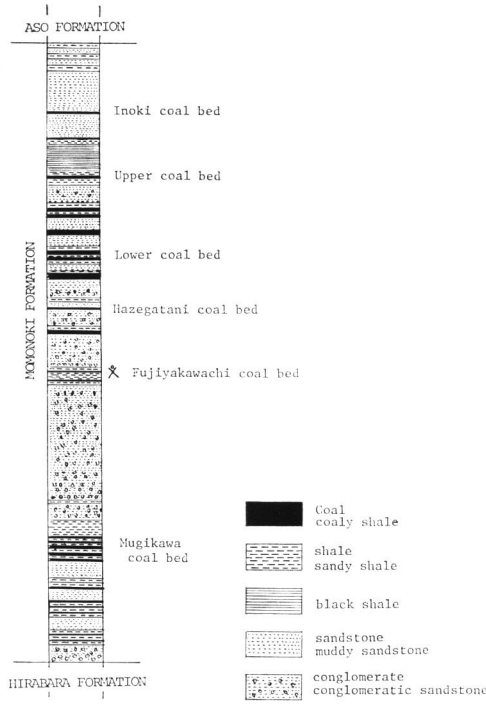


Fig. 1. Geologic columnar section of the Momonoki Formation.

*macrophyllum*

- B. Non-trizygoid, curving vein type.....*Parasphenophyllum*  
 from China, *Parasphenophyllum shansiense*, *P. thonii*, *P. thonii* var. *minor*, *P. spinulosum*, *P. neofimbriatum*, *P. scopulatum*,\* *P. spathulatum*\*  
 from Thailand; *Parasphenophyllum phetchabunense*  
 from Japan; *Parasphenophyllum okafujii* (from Upper Triassic)
- C. Trizygoid, straight vein type.....*Trizygia*  
 from China; *Trizygia oblongifolia*, *T. grandeoblongifolia*, *T. speciosa* *T. densinervia*,  
*T. sincoreana*  
 from Korea; *Trizygia grandifolia*  
 from Japan; *Trizygia ominensis* (from Upper Triassic)
- D. Trizygoid, curving vein type.....*Paratrizygia*  
 from China; *Paratrizygia koboensis*\*  
 from Korea; *Paratrizygia inequifolia*, *P. glossopteroides* f. *minor*, *P. koboensis*  
 from Japan; *Paratrizygia maiyaensis*, *P. uedai*

**Description of Species**Genus *Parasphenophyllum* ASAMA, 1970*Parasphenophyllum okafujii* ASAMA et OISHI, n. sp.

Fig. 2

*Description:* Stem unknown. Six leaves are arranged radially from the center, obovate in shape, about equal in size, 15–17 mm long and 8–9 mm wide at the widest part, and margin entire. Midrib distinct, running straight to the distal margin. Side veins indistinct, curving outwards.

*Locality:* Omine colliery, Omine-cho, Miné City, Yamaguchi Prefecture.

*Horizon:* Fujiyakawachi coal bed of Momonoki Formation, Upper Triassic (Carnian).

*Depository:* Holotype. The Miné City Museum of History and Folk-Custom, MMHF2-00004

*Remarks:* The holotype available in describing *Parasphenophyllum okafujii* n. sp. was collected by Hideo ISHIDA.

The specimen is not well preserved but the obvate four leaves which are arranged

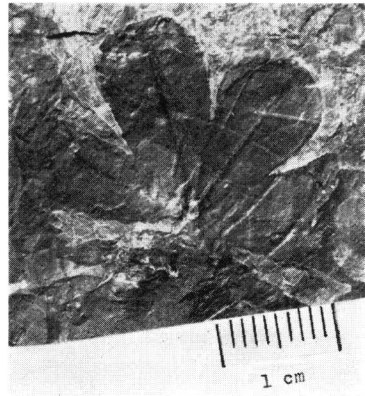
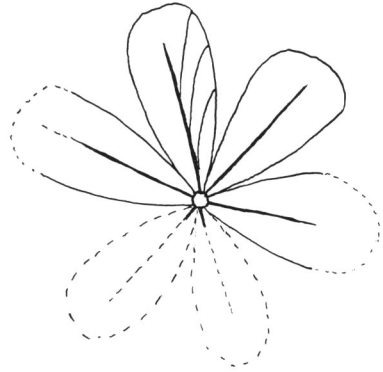


Fig. 2. *Parasphenophyllum okafujii* ASAMA et OISHI, n. sp. Locality: Omine colliery, Omine-cho, Miné-City, Yamaguchi Prefecture. Horizon: Fujiyakawachi coal bed, Momonoki Formation (Carnian). Depository: Holotype. The Miné City Museum of History and Folk-Custom, MMHF2-00004.

radially from the center, and the very short portion of the other two leaves are observable as shown in Fig. 2,

In 1970, ASAMA reviewed the genus *Sphenophyllum* which were reported from Cathaysia land, using the types of arrangements of leaves and venation as stated previously. There is no doubt that the specimen described here belongs to *Parasphenophyllum* of ASAMA's classification of Sphenophyllales by the non-trizygoid arrangement of leaves and the curving side veins. *Parasphenophyllum okafujii* is characterized by the distinct midrib of leaves. In general the so-called *Sphenophyllum* have no midrib. Only one species having midrib, *Paratrizygia koboensis* (KOBATAKE), was described by KOBATAKE (1957) from the Upper Permian Kobosan Series of Korea. *Parasphenophyllum okafujii* resembles *Paratrizygia koboensis* in having midrib but the arrangement of leaves of the former is non-trizygoid and that of the latter is trizygoid.

It seems that the midrib appears in the latest stage of the evolution of leaves in this group. The latest species were *Paratrizygia koboensis* in the evolution of *Paratrizygia* series and *Parasphenophyllum okafujii* in *Parasphenophyllum* series.

In *Parasphenophyllum gilmorei* (WHITE, 1929), the midrib is present or absent in the leaves. So the midrib sometimes found in the leaves of *Sphenophyllum gilmorei* from the Permian Hermit shale is not a fixed character of the species.

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