ARCHEOZOSTERA, A NEW GENUS FROM UPPER CRETACEOUS IN JAPAN

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INTRODUCTION

THE fossil was collected from the Izumi Sandstone, the age of which belongs to Upper Cretaceous. The shape of the fossil is preserved in good state by sandy matrix, but the inner structure of fossil is not enough.

The fossil has been recognized in Japan as Iris-Stone or fucoid by external shape, but it differs from *Iris* by the attachment of seed, winged stems and the structure of leaf.

We have proposed the name *Archeozostera* by one side attachment of the fruit on long spike, enclosed by spathe-like leaves, branching modus, and by habitat place.

In this paper, the characters and affinity of the fossil are described.

DESCRIPTION

Archeozostera gen. nov.

Localities — The fossils were mostly collected from Izumi, Osaka Pref., Southern Awaji, Hyogo Pref., Itano-gun, Awa-gun and Mima-gun, Tokusima Pref., Kagawa-gun, Ayauta-gun and Mitoyo-gun, Kagawa Pref. and some from Yuhutu-gun in Iburi Pref., Hokkaido. The Geological age belongs to Upper Cretaceous (TEXT-FIG. 1).

Character — The shoot is found usually somewhat concaved, ascending upward and composed of 3 parts, viz. broadly axial part, lower part with regularly alternate vegetative leaves and upper part with congested flowering leaves.

AXIAL PART — The axial part is a stem with broad wing on both sides as in Pl. 2, Figs. 5, 6. The shape of stem part is elliptic, and its structure is homogeneous and is lacunous with parenchymatous tissue (PL. 2, FIG. 8).

LOWER PART — Arrangement of lower vegetative leaves on stems is alternate and regular (PL. 1). Their cross-section at middle part is flat with distinct midrib beneath (PL. 2, FIGS. 6b, c). At a glance their external shape did not differ from upper leaves by waved impression of midrib (PL. 1, FIGS. 1-4).

The lateral section of remote part from the stem shows that the basal leaves locate higher level than that of upper leaves by the attachment on curved stem (PL. 2, Fig. 6c). The leaves have thick midrib as shown in Pl. 2, Figs. 5d, 6c. Their lower part grasped the stem but did not form a sheath.

UPPER PART — The terminal part is congested with many large leaves (PL. 1, FIGS. 3, 4), which differ from lower leaves by being involute on both margin, without thick midrib beneath but with axis adhering to the innerside in the middle part (PL. 2, FIG. 7), and the cross-section of which is flat elliptic.

The character of flowering shoot is common to that of Araceae, Zosteraceae and Sparganiaceae. Upper leaves bear one row of fruits on the axis (PL. 2, FIG. 9), therefore, upper leaves of the fossil are considered as the spathe including spadix on the peduncle but the demarcation between peduncle and stem is not clear enough, because of winged stem.

FLOWER AND FRUIT — Flower is unknown. Fruits are found in one row overlapping just as in *Phyllospadix* on the spathe leaves (PL. 2, FIG. 9). The spadix is considered as adhesive to spathe leaf (PL. 2, FIG. 7).

Consideration of the Habitat — The fossil plant is considered as a submerged water plant, because of nearly the same height of reproductive leaves and lacunous stem with parenchymatous tissue (PL. 2, FIG. 8).

The growing place is probably a shallow bay, judged from its hemiprostrate shoot, undifferentiated leaves and the association of marine fossils such as coral and ammonite.

Large involute spathe of the plant is considered as a flower floating organ, because it is cymbiform and nearly at the same height. The character is common to that of other water phanerogamic plants. The complexity

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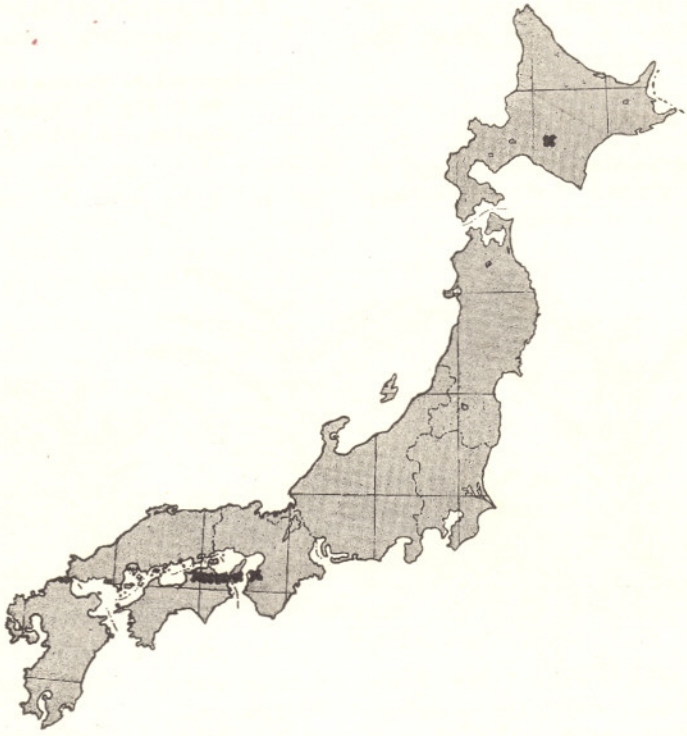
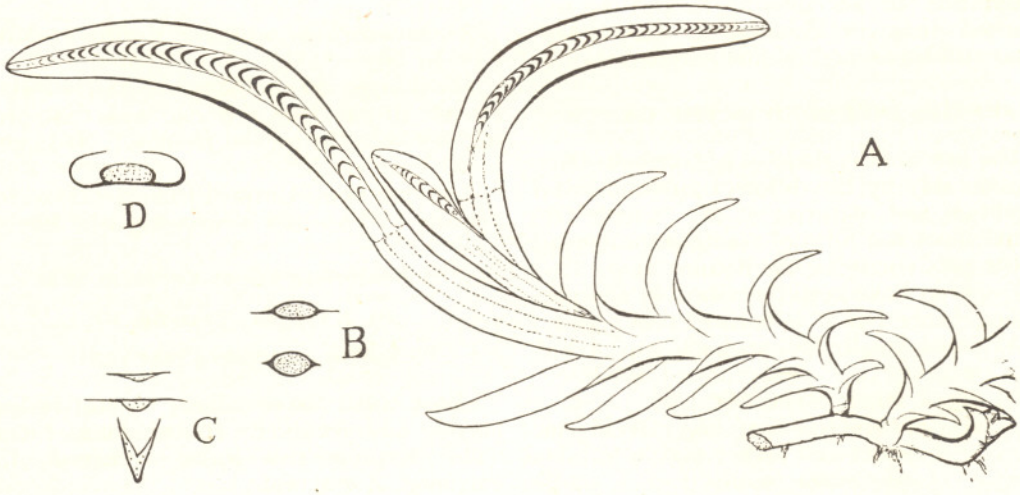


TEXT-FIG. 1.



TEXT-FIG. 2.

of the upper flowering part is considered by rhipidate branching of lateral shoot like *Zostera* (TEXT-FIG. 2).

AFFINITY

The characters mentioned above and its habitat remind *Zostera* and *Phyllospadix* because of the attachment of the flower on one side of long spadix, the branching modus of flowering shoot, but the plant differs from them by the adhesion of spadix to the spathe, winged stem and undifferentiated sheath.

The character of spadix enclosed in spathe shows intimate relation to Araceae especially to *Acorus calamus*.

The fossil has intermediate characters between Araceae and Zosteraceae, but the adaptation to an aquatic habitat is less marked than in Zosteraceae with somewhat stiff leaves and undifferentiated sheath.

SPECIES INCLUDED IN THE GENUS

The size and the shape of water plants vary considerably by the different environmental condition and maturing stage. Simple terminal shoot is a form of young stage instead of complex one being the mature state.

7 species have been described in the preceding paper but it is reduced to 4 species.

A) Shoot small: 30 cm. high, top of leaf recurved . . . . . *Archeozostera minor*

B) Shoot large: 50-60 cm. high

(a) Reproductive leaf long: 30-35 cm.

i. Shoot and leaves narrow . . . *Archeozostera lineata*

ii. Shoot and leaves broad . . . *Archeozostera longifolia*

(b) Reproductive leaf short: 15 cm. . . . *Archeozostera pinnata*

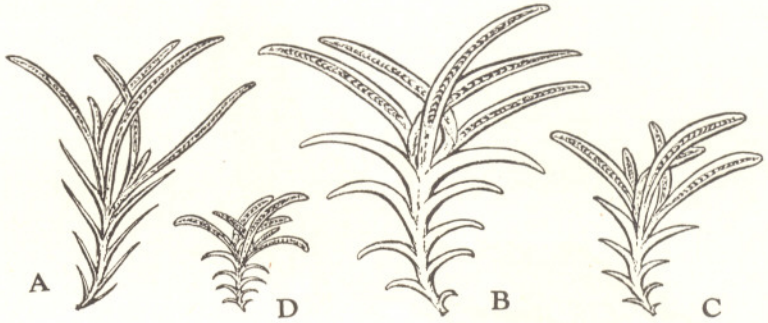
Archeozostera lineata Koriba et Miki

Pl. 2, Fig. 11; Text-fig. 3A

Koriba and Miki (1931) 22

Shoot 40-50 cm. high, vegetative leaves narrow: 5 cm. long, 0·7 cm. wide. Reproductive leaves narrow-long: 25 cm. long, 2·5 cm. wide.

The species is identified from *Archeozostera pinnata* by narrow long leaves.



TEXT-FIG. 3.

Archeozostera longifolia Koriba et Miki

Pl. 1, Figs. 1, 4; Text-fig. 3B

Koriba and Miki (1931) 22

Archeozostera simplex Koriba et Miki (1931) 20

Archeozostera angustifolia Koriba et Miki (1931) 20

Shoot large: 60 cm. high, vegetative leaves broad: 10 cm. long, 1·5 cm. wide. Reproductive leaves large and recurved: 30-35 cm. long, 3 cm. wide.

The species is identified from *Archeozostera pinnata* by long and recurved spathe leaves.

Archeozostera minor Koriba et Miki

Pl. 2, Fig. 9a; Text-fig. 3D

Koriba and Miki (1931) 23

Shoot small: 30 cm. high, vegetative leaf narrow and recurved: 10 cm. long, 1 cm. wide. Reproductive leaves recurved: 1·5 cm. long, 2 cm. wide.

The species is identified from other species by small size and recurved leaves.

***Archeozostera pinnata* Koriba et Miki**

Pl. 1, Fig. 3; Text-fig. 3C

Koriba and Miki (1931) 22

Archeozostera brevifolia Koriba et Miki (1931) 20

Shoot hemiprostrate: 40 cm. high, vegetative leaves short, not recurved: 6 cm. long, 1 cm. wide. Reproductive leaf short and broad: 15 cm. long, 2 cm. wide.

The species is identified from *Archeozostera minor* by broad leaves and not recurved top of leaves.

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EXPLANATION OF PLATES

(Scale mm. units)

PLATE 1

1, 4. *Archeozostera longifolia* Koriba et Miki.

1. From Tanagawa-mura in Sennan, Osaka Pref. × $\frac{1}{5}$.

4. From Miyagoti in Itano-gun, Tokusima Pref. × $\frac{1}{3}$.

2, 3. *Archeozostera pinnata* Koriba et Miki. From Soryudani in Ebara-tyo, Mima-gun, Tokusima Pref. 2. × $\frac{1}{2 \cdot 6}$, 3. × $\frac{1}{3}$.

PLATE 2

5. Cross-section of lower part of stem.

6. Cross-section of vegetative leaves: (a) Terminal part (middle one); (b) Basal part (right side of stem); (c) Lateral section remote from axis.

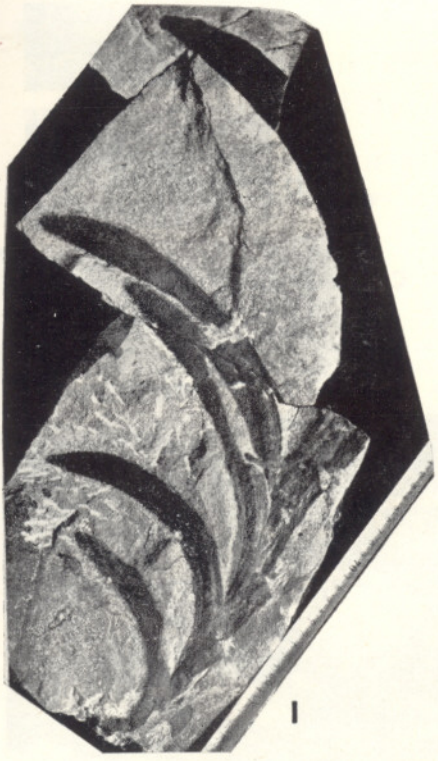
7. Cross-section flowering leaves.

8. Magnified stem of spadix. × 65.

9. Overlapping fruit on spadix: (a) *Archeozostera minor* Koriba et Miki from Ehara-tyo, Mima-gun, Tokusima Pref. × $\frac{1}{2 \cdot 5}$; (b) Fruit of *Archeozostera longifolia* Koriba et Miki from Tanagawa in Sennan, Osaka Pref.

10. Rhizome (probably). From Nakayama in Ehara-tyo, Mima-gun, Tokusima Pref. × $\frac{1}{2}$.

11. *Archeozostera lineata* Koriba et Miki. From Izumitani in Itano-gun, Tokusima Pref. × $\frac{1}{2 \cdot 3}$



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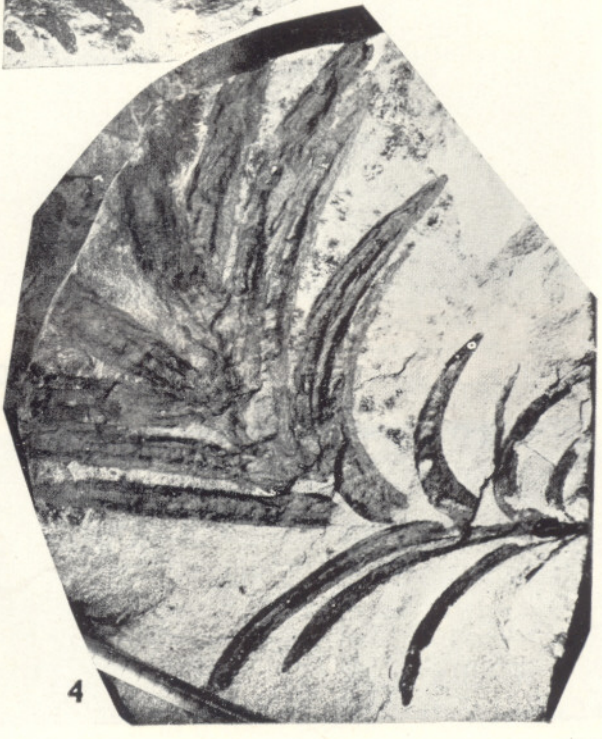

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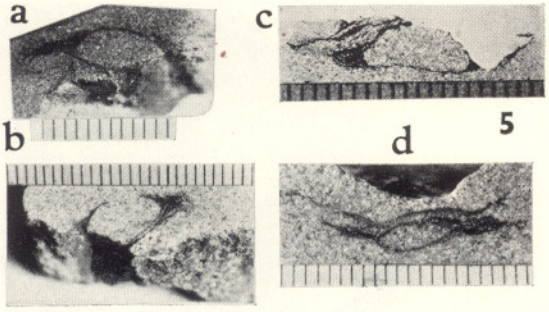
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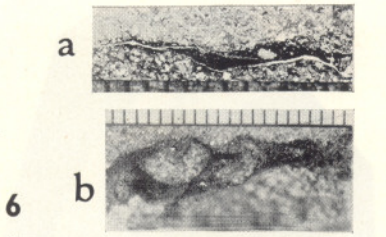
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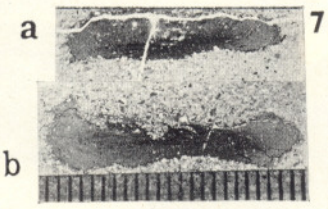
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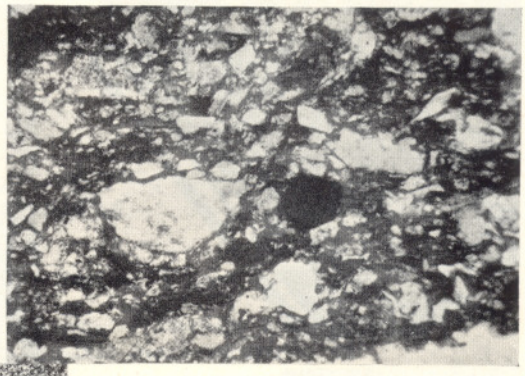
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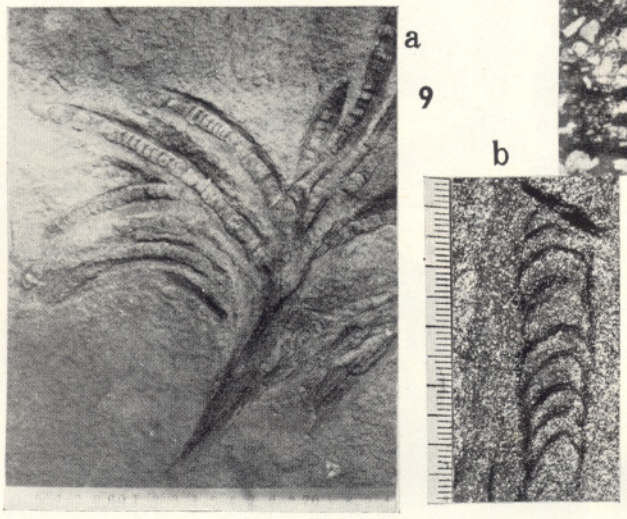
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