

カタクリ(ユリ科)の異常栄養生長と栄養繁殖について

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Shoichi KAWANO* : On the Abnormal Vegetative Growth and Reproduction in *Erythronium japonicum* (L.) DECNE. (Liliaceae)**

河野昭一* : カタクリ (ユリ科) の異常栄養生長と栄養繁殖について

Erythronium japonicum (L.) DECNE. (Liliaceae), a typical "spring plant", is one of the representative woodland perennials of ancient Arcto-Tertiary origin (UTECH and KAWANO, 1975), and is somewhat widely

distributed in eastern Asia, including the Islands of Japan (OHWI, 1972). According to our recent studies concerning its eco-physiology and life history, this species is 'shade intolerant', in showing assimilation

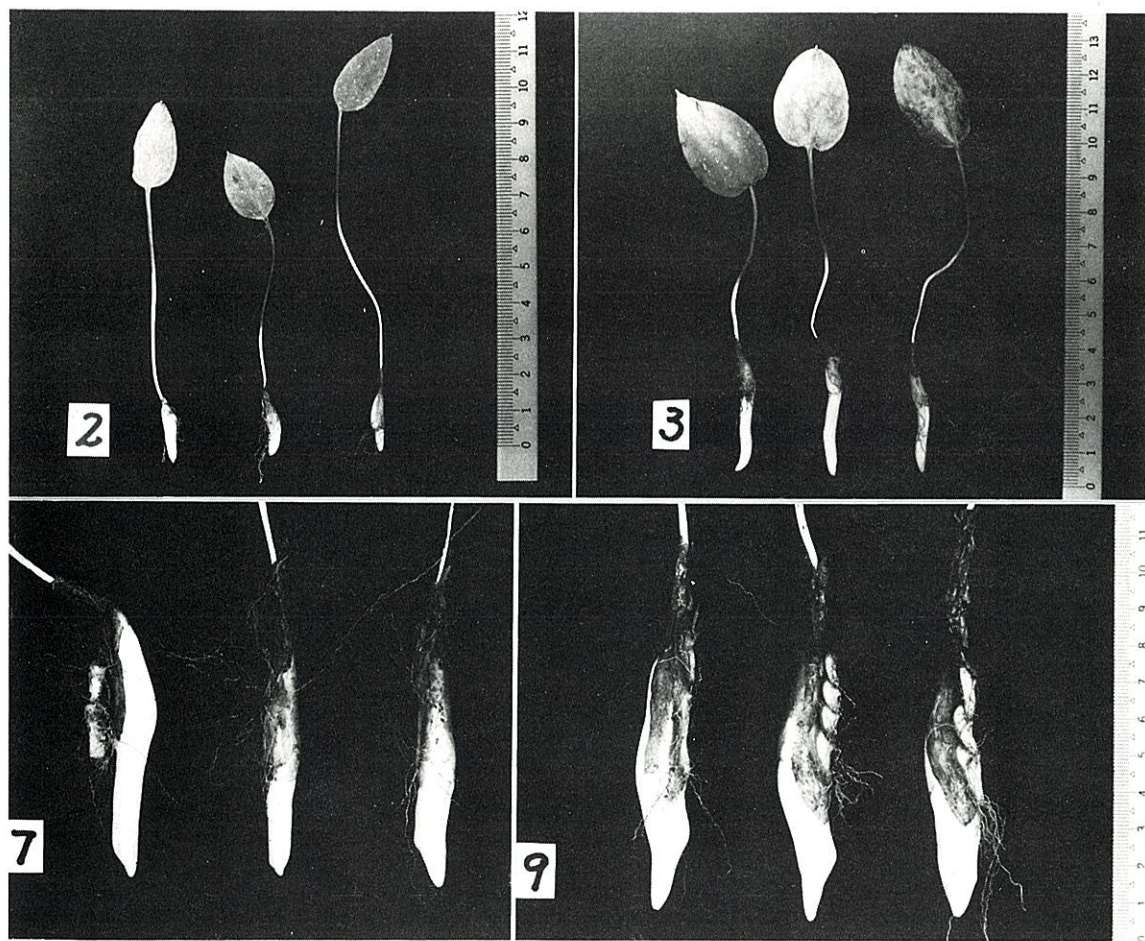


Fig.1. Photographs showing the plants (and bulbs) of *E. japonicum* belonging to different size-classes. Figures in the photos indicate four different size-classes, respectively. Note the appendages formed in those belonging to size classes 7 and 9. For further details, see KAWANO et al., 1982.

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characteristics similar to "sun-leaf" (KAWANO, TAKASU and NAGAI, 1978; LUNDEGÅRDH, 1921; SPARLING, 1967), and possesses life history characteristics referable to a so-called K-strategist (KAWANO, HIRATSUKA and HAYASHI, 1982; MACARTHUR and WILSON, 1967; PIANKA, 1970).

This species usually propagates exclusively by means of sexual reproduction, although its "clutch size" is moderately small, i. e., average seed output per plant ranges from 16.1~27.1 (KAWANO et al., 1982). As shown in Fig. 1 (photo), *E. japonicum* normally produces a single shoot from its bulb, irrespective of its size, and this occurs repeatedly every season as the normal growth process of the individual plant. As described previously (KAWANO et al., 1982), in all sterile individuals from the size classes 2 to 5, the entire food reserves in the bulbs are consumed for growth, and stored in the newly formed bulbs. From the seventh year onward, however, the unconsumed remnant of the previous year's bulb at the end of the growing season remains attached to the newly formed main bulb, thus forming an appendage each year (Fig. 1). Beyond a certain critical size in biomass (size class 7 or 8) (KAWANO et al., 1982), the plant produces two basal

leaves, and a single scape and flower.

However, the individuals with very peculiar growth forms are occasionally encountered in the field. Figs. 2 and 3 illustrate some examples of such individuals with abnormal vegetative growth. Exhibited in Figs. 2-A and 3-A is a form with two large bulbs which are connected to each other by an appendage. A single leaved sterile shoot and two-leaved fertile shoot are produced from each bulb, respectively. Figs. 2-B and 3-B show a form with one small and one large sterile shoots sprouting one small and one large bulbs which are connected to each other. A form shown in Figs. 2-C and 3-C is most peculiar. Four different small sterile shoots are produced from a single fractured but still connected bulb. There is no doubt, however, that in the meantime each different shoot which sprouted from connected bulbs as shown in A, B and C (Figs. 2 and 3) will become separated and independent individuals.

In our previous paper (KAWANO et al., 1982), we have described a constant recruitment of individuals by sexual reproduction and subsequent regular growth from the seedling stage in *E. japonicum*, at least in the center of its distribution. Indeed, this is the usual situation in natural populations. However, as shown

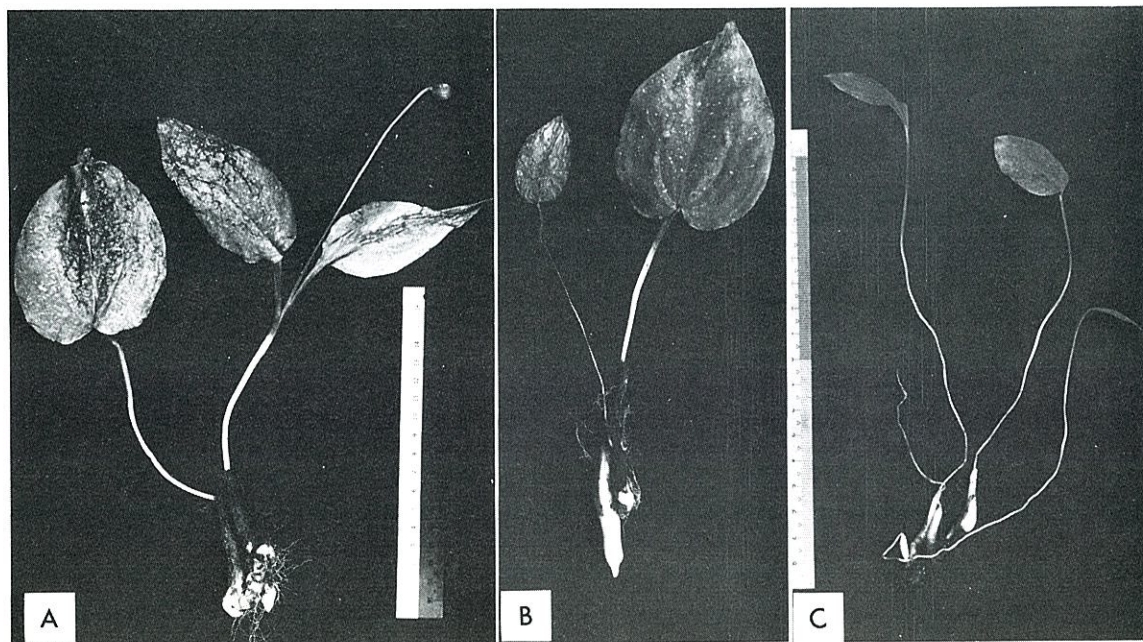


Fig. 2. Photographs showing the individuals of *E. japonicum* with abnormal vegetative growth. A, a form with two large bulbs connected each other by appendages, and with a single-leaved sterile shoot and two-leaved fertile shoots from the bulbs, respectively; B, a form with one small and one large sterile shoots sprouting from two bulbs connected each other; C, a form with four small sterile shoots growing from a single fractured but still connected bulb.

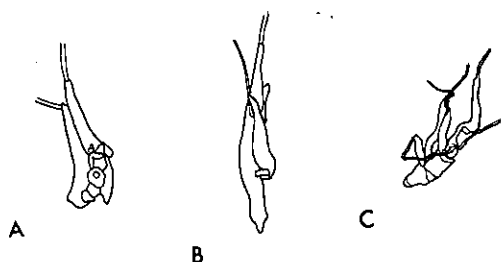


Fig. 3. Drawings of the bulbs made based on the photos in Fig. 2.

here, the replenishment of individuals by vegetative reproduction also occurs in this species, though accidental and considerably limited in extent. The mode of vegetative reproduction in *E. japonicum*, however, is very different from the North American species of *Erythronium*. In either *E. americanum*, *E. albidum* or *E. propullans* (MULLER, 1980; BANKS, 1980) separation of cormlets which are formed at the tip of the underground stolons regularly takes place at the end of every season (KAWANO et al., unpublished).

Further critical observations in both field and artificial populations will unravel the role of asexual reproduction for the recruitment of individuals in *E. japonicum*.

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摘要

KAWANO, HIRATSUKA & HAYASHI (1982) は、最近日本の温帯林の代表的な春植物の一種であるカタクリ（ユリ科）の生活史の諸特性に関して詳細な研究結果を報告したが、そのなかで、この種の次世代の補充は有性繁殖にそのほとんどが依存していることを明らかにした。カタクリの交配様式は典型的な外交配型で（UTECH & KAWANO, 1975; KAWANO & NAGAI, 未発表）、個体当りの clutch size は平均で16.1~27.1とあまり大きくないが、地域集団ごとの size class 構造の分析結果からみると、各個体群における個体の補充は有性繁殖によっていることは明白である。

しかしながら、この報告で述べるような、異常な栄養生長に起因する栄養繁殖個体が、ごくまれではあるが存在することも確かである。通常、一定の大きさ以上の鱗茎では、春地上部展開のために消費した残りの貯蔵物質を鱗茎附属部（appendage）として残す（注、Fig. 1-7 および 9）。普通、カタクリは例外なしに、1個の鱗茎より1個の shoot しか生じないが、この鱗茎附属部の一部が介在して自然集団の個体中に Fig. 2 に示すような、複数の地上部 shoot を生ずる奇妙な個体にごくまれではあるが遭遇する。多くの場合、このような形態を示すものは、何らかの力が外から加えられて、鱗茎の一部が壊れたり、裂けたりすることに起因して生ずるものと思われる。いずれにせよ、これらの鱗茎附属部が分離することにより、無性的な個体の増加にごく限られた規模ではあるが、自然集団中で起きていることは確かである。この点では、日本産カタクリは北米東部の落葉樹林の林床に生育し、極めて旺盛な栄養繁殖によって個体を殖す性質をもつ *E. americanum*, *E. albidum*, *E. propullans* などの種類とは、著しく異った繁殖戦略を保有していることが明らかである。

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