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著者	Kurita Masahide
著者別表示	栗田 正秀
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# Masahide KURITA\* : Some Notes on the *Rhododendron* Plants from Japan XII

## A Stoma and its Adjoining Epidermal Cells

栗田正秀\*: 日本産ツツジ属植物雑報 (十二)  
気孔とその隣接表皮細胞

*Rhododendron quinquefolium* is readily distinguishable from *Rh. pentaphyllum* by their floral characters. The two species are, however, rather difficult to be distinguished from each other only by an observation on their leaves, because the gross morphology of their leaves are considerably similar. It has been found by the present author that the two species are different from each other in a feature of epidermal cells contracting with their guard cells in an epidermis of leaf. The results will be reported in this paper.

### Materials and Method

Fully grown leaves were collected from two individuals of each species in the latter part of September, 1980. All of the individual plants were growing within a radius of about 25 meters at Buhei Pass of Mt. Gozai-sho, Mie Prefecture. All observations were based upon a surface view of an abaxial epidermis of leaf.

In this paper, the term, stoma, means a pair of guard cells and the pore between them.

### Observations

In an abaxial epidermis of leaf, the size of one guard cell per stoma is measured, and the results are shown in Table 1. There is no difference in the guard cell size between

*Rh. quinquefolium* and *Rh. pentaphyllum* as seen from the table.

Epidermal cells surrounding a single stoma vary from 3 to 7 in number both in *Rh. quinquefolium* and in *Rh. pentaphyllum* with the exception of 9 in the latter species as shown in Table 2. Stomata surrounded by 3 and 4 epidermal cells are more frequently seen in *Rh. quinquefolium* than in *Rh. pentaphyllum*, and those with 5 to 7 cells are more common in *Rh. pentaphyllum* than in *Rh. quinquefolium*. In *Rh. quinquefolium*, the case of 4 cells (Fig. 1) is far more common than any other case, and in *Rh. pentaphyllum* the case of 5 cells (Fig. 2) is far more common than any other. Thus a difference in surrounding cells exists between the two species.

An area covered with a stoma and its adjoining epidermal cells is generally far larger in *Rh. quinquefolium* than in *Rh. pentaphyllum* (Compare Fig. 3 with Fig. 4). In the latter species (Fig. 2 and 4), the surrounding epidermal cells are generally a little smaller than their respective guard cell, and furthermore are somewhat or significantly smaller than the other epidermal cells. An outline of a group of the epidermal cells contracting with a stoma is often found to run nearly parallel with an outline of the stoma (Fig.

Table 1.

Species	Guard cells	
	Length ( $\mu$ )	Breadth ( $\mu$ )
<i>Rh. quinquefolium</i>	21.4-27.6 (24.7)	5.6-7.8 (6.4)
<i>Rh. pentaphyllum</i>	20.8-25.2 (23.4)	5.6-8.3 (7.0)

\*2-98, Akatsukidai 2 chome, Yokkaichi, Mie Prefecture, 512 三重県四日市市あかつき台2-2-98(〒512)

Table 2.

Number of epidermal cells contacted with single stoma		3	4	5	6	7	8	9	Total
Number of stoma	<i>Rh. quinquefolium</i>	48 (15.6)	152 (49.5)	84 (27.3)	20 (6.5)	3 (0.9)	0	0	307 (%)
	<i>Rh. pentaphyllum</i>	8 (2.6)	86 (28.0)	138 (44.9)	59 (19.2)	15 (4.8)	0	1 (0.3)	307 (%)

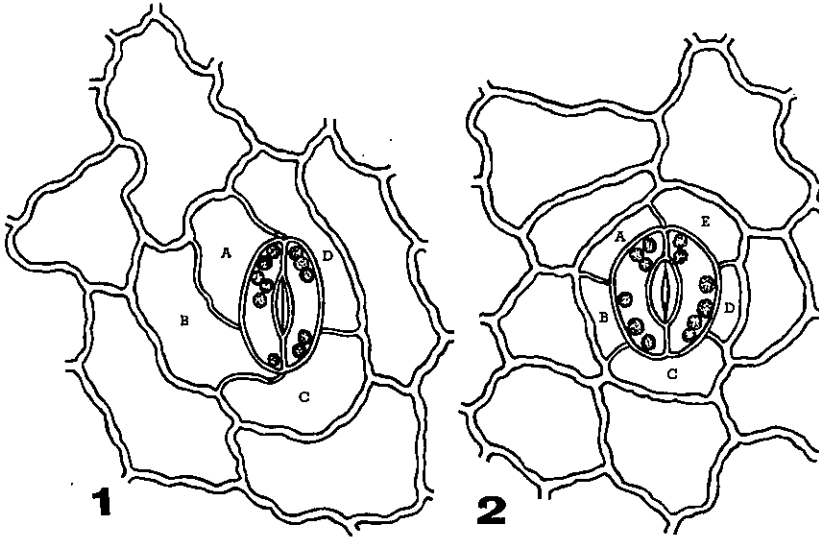


Fig. 1 and 2. Stoma and its adjoining epidermal cells. 1, *Rh. quinquefolium*. stoma bounded with 4 large cells (A-D). 2, *Rh. pentaphyllum*. stoma bounded with 5 small cells (A-E), outline of the cell group being nearly parallel to that of stoma.  $\times 720$

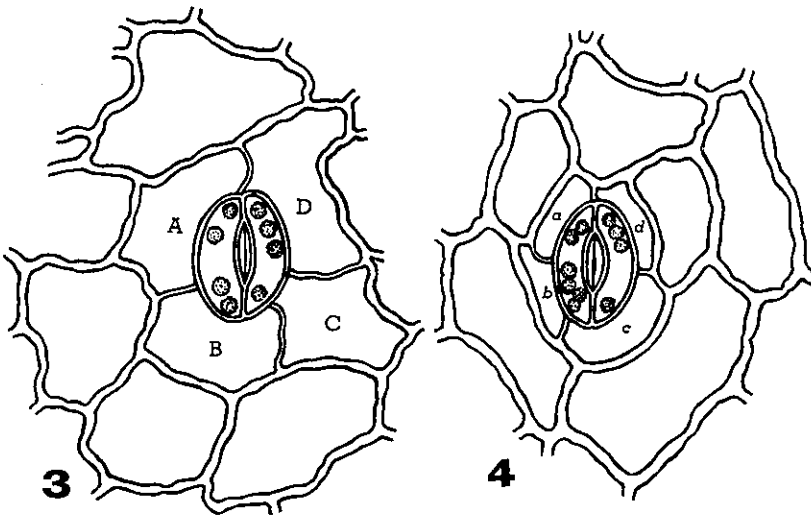


Fig. 3 and 4. Stoma and its adjoining epidermal cells. 3, *Rh. quinquefolium*. large area covered with stoma and 4 large cells (A-D), outline of the cell group being undulate in contrast to that of stoma. 4, *Rh. pentaphyllum*. small area covered with stoma and 4 small cells (a-d).  $\times 720$

2). In *Rh. quinquefolium* (Figs. 1 and 3), the epidermal cells which contact with a stoma are usually as large as the other epidermal cells. However, in the ceses where 5 to 7 epidermal cells contact with a stoma, at least one of them is often smaller than a guard cell as well as the ordinary epidermal cell. An outline of a group of the epidermal cells contacting with a stoma is undulate, in contrast to an outline of the stoma.

#### Discussion

According to KITAMURA and MURATA (1974), the two species, *Rh. quinquefolium* and *Rh. pentaphyllum*, have  $2n = 26$  chromosomes. As shown in this paper, these species are not different from each other in the size of their guard cells. Therefore it is not generally considered that an epidermal cell size difference exists between the two species. All the plants, from which the leaves were collected, were growing within a radius of about 25 meters. Consequently, they are

not thought to be different from one another in their growing conditions.

As shown in Table 2, a stoma has a tendency to be surrounded with more epidermal cells in *Rh. pentaphyllum* than in *Rh. quinquefolium*. This fact seems to show that (1) a division of an initial cell of stoma occurs in more directions or (2) divisions of epidermal cells in contact with the initial cell occurs more frequently in the former species than in the latter species. In *Rh. pentaphyllum*, a stoma surrounded by 5 epidermal cells is far more common than any other stoma, and in *Rh. quinquefolium* a stoma surrounded by 4 epidermal cells is far more common than any other. This difference is very distinct between the two species.

Generally speaking, the area covered with a stoma and its adjoining epidermal cells is far larger in *Rh. quinquefolium* (Fig. 3, cell A-D plus stoma) than in *Rh. pentaphyllum* (Fig. 4, cell a-d plus stoma). This is based on the fact that the adjoining epidermal cells are large in the former species and are small in the latter species. An outline of a group of the epidermal cells mentioned above is *Rh. pentaphyllum* has the outline nearly parallel to the stoma (Fig. 4). Consequently, it may be considered that, through cells development of a leaf, (1) a stoma initial cell in *Rh. quinquefolium* is namely a mother cell of stoma in many cases, and (2) the divisions of the initial cell and of the epidermal cells adjoining the initial cell occurs more frequently in *Rh. pentaphyllum* than in *Rh. quinquefolium*,

producing some small cells (subsidiary cells) which surround the stoma mother cell.

This difference in stomatal apparatus cell divisions between the two species is not considered to be based on a difference in surroundings or growing conditions of each species but on a character peculiar to each species.

#### References

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#### 摘要

ツツジ属2種(ゴヨウツツジ・アケボノツツジ)の葉で、気孔(孔辺細胞を含む)に接着し、それをとり囲む表皮細胞の様子が調査された。

両種ともに、気孔は3~7個の表皮細胞で囲まれているが、3および4表皮細胞で囲まれた気孔はゴヨウツツジに多く、5~7個の表皮細胞で囲まれた気孔はアケボノツツジに多い。前種内では4表皮細胞で、後種内では5表皮細胞で囲まれた気孔がもっとも多く、この差は顕著である。

一般的にいて、ゴヨウツツジでは気孔を囲む表皮細胞は大きく、その細胞群の輪かくは波状をしているが、アケボノツツジの気孔を囲む表皮細胞は小さく、その群の輪かくはほぼ気孔のそれに似ている。

両種間にみられる前述の差異は、環境の差によるのではなく、それぞれの種に特有な性質によるものとおもわれる。

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○ 沖縄自然研究会編：沖縄県自然環境保全地域指定候補地学術調査報告書—於茂登岳及びその周辺地域—。沖縄県 1981, 3, 31, 発行。B 5 版, 172 頁。非売品。

於茂登岳は、標高 526 m, 石垣島で最も高く、多くの固有種や分布上貴重な種類に富み、学術上重要な地域である。本書はその地形・地質・動植物・信仰習俗についての調査報告書である。(里見信生)

○ 伊藤秀三編：雲仙・原生沼の研究 長崎県環境部, 1980, 12, 25, 発行。B 5 版, 70 頁。非売品。

雲仙・原生沼は、雲仙天草国立公園の雲仙岳の山麓にある湿原で、初夏のカキツバタの花の美くしさをはじめとして、四季それぞれの自然は訪れる者の目を楽しませてくれる。しかし、湿原は次第に乾燥化する現状であるので、種々の保全対策が必要である。本書は、その保護のための基礎資料を得る目的で行なわれた調査報告書であり、本会々員では、総括・植物生態を伊藤秀三、蘚苔類・環境を中西こずえ、自然保護を川里弘孝の3氏が分担執筆して居られる。(里見信生)