

# The morphology of the stigma surface of *Petunia hybrida* hort. *superbissima* as seen in scanning electron microscopy

S. MUSZYŃSKI, J. KOCON, W. GUZEWSKI, I. BIEGUŃSKI

Institute of Genetics and Plant Breeding, Warsaw Agricultural University

(Received: March 28, 1976)

## Abstract

The ultrastructure of stigma surface in allotetraploid petunias was analyzed by scanning electron microscopy. The stigma forms a bilobed structure with a distinct central depression. The stigma surface is covered with numerous papillate hairs of ununiform sizes and shapes.

## I. INTRODUCTION

There is a little information concerning the structure of stigmas in *Petunia*. Konar and Linsken's (1966) analyzed the stigma surface of diploid petunias by interference microscopy. They observed that the stigma forms a flat, bilobed structure with a central depression, and that the surface of the stigma is covered by a large number of papillate hairs.

There are, however, no data in literature concerning the stigma of tetraploid petunias. It seemed therefore reasonable to the present authors to examine the stigma surface of the allotetraploid petunias.

As it was shown by Beaseley (1975), scanning electron microscopy offers a good possibility to study the ultrastructure of floral morphology.

## II. MATERIAL AND METHODS

Allotetraploid petunias (*Petunia hybrida* hort. *superbissima*) were grown in the greenhouse. Fully developed flowers were taken for analysis. Freshly collected styles were attached to the holders with "Dotite" silver paint, dried, inserted into vacuum chamber, and after rapid evacuation covered with a carbon layer of 50 Å and a gold layer of 200 Å. The observations and photographs were made with the JSM-35 scanning electron microscope, operated at 25 kV.

## III. RESULTS AND DISCUSSION

The stigma of the allotetraploid garden petunias forms a bilobed structure with a distinct central depression, similar to the stigma of diploid petunias. The stigma surface is covered with numerous papillate hairs, which are smaller in younger flowers and bigger in older ones (Fig. 1a, b). The younger flower shows small papillae near the central depression (Fig. 2a) and bigger papillate hairs towards the margins (Fig. 2b). The papillate hairs of the older flowers are markedly longer, forming sometimes even very long hairs (Fig. 2c). The hairs are also very dense (Fig. 2d). The papillae and the papillate hairs of the older flowers are more or less uniform in size, but of various shapes, ranging from very regular to irregularly developed structures (Fig. 3). Also the surface of the papillate hairs is irregular, showing bubbles and cavities.

In general, the structure of the stigma surface in diploid and in allotetraploid petunias is similar. The papillae and the papillate hairs are much more dense in the allotetraploids. A marked difference concerns the structure of the papillate hairs themselves; it is smooth in diploids while being uneven in allotetraploids, forming small bubbles and cavities.

Well developed ultrastructure of the stigma surface helps in keeping pollen grains on stigmas after pollination and therefore it is of special importance for the propagation of the species.

## REFERENCES

- Beasley C. A., 1975. Developmental morphology of cotton flowers and seed as seen with the scanning electron microscope. *Amer. J. Botan.* 62: 584—592.  
Konar R. N., Linskens H. F., 1966. The morphology and anatomy of the stigma of *Petunia hybrida*. *Planta (Berl.)* 71: 356—371.

## Authors' address

Dr. Stanisław Muszyński et al.  
Institute of Genetics and Plant Breeding  
Warsaw Agricultural University;  
Nowoursynowska 166; 02-766, Warszawa, Poland

*Morfologia powierzchni znamienia u Petunia hybrida hort. superbissima, widziana w mikroskopie elektronowym skanningowym*

## Streszczenie

Znamię zawieratki (*Petunia hybrida hort.*) allotetraploidalnej (grupa *superbissima*) pokryte jest licznymi uwypukleniami o różnej wielkości i kształcie; niekiedy przyjmują one postać włosków.

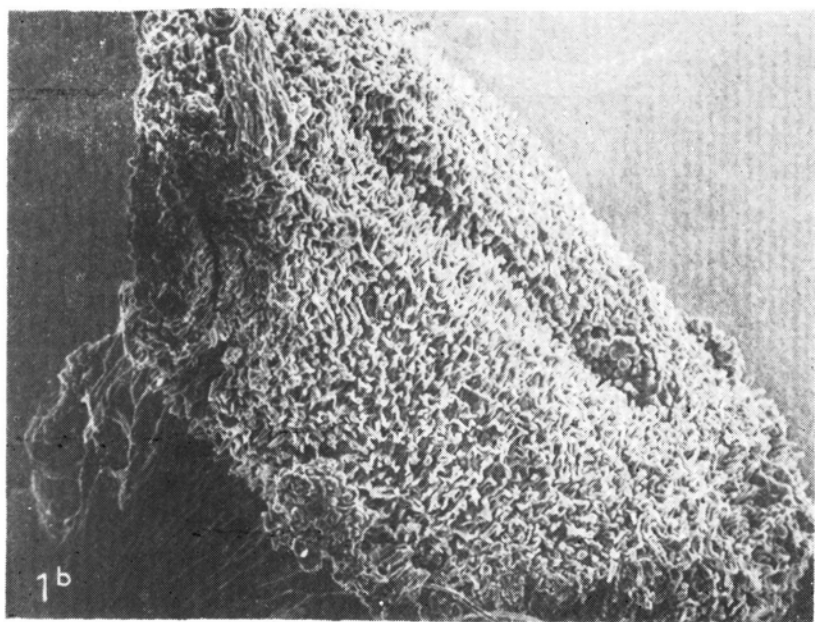
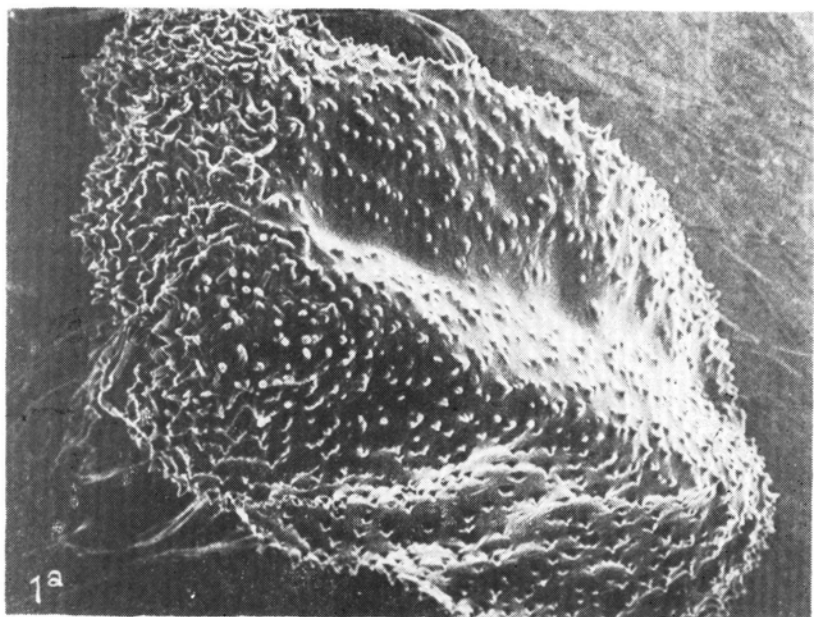


Fig. 1a. The surface of the stigma of younger flower ( $\times 60$ ).  
Fig. 1b. The surface of the stigma of an older flower ( $\times 40$ )

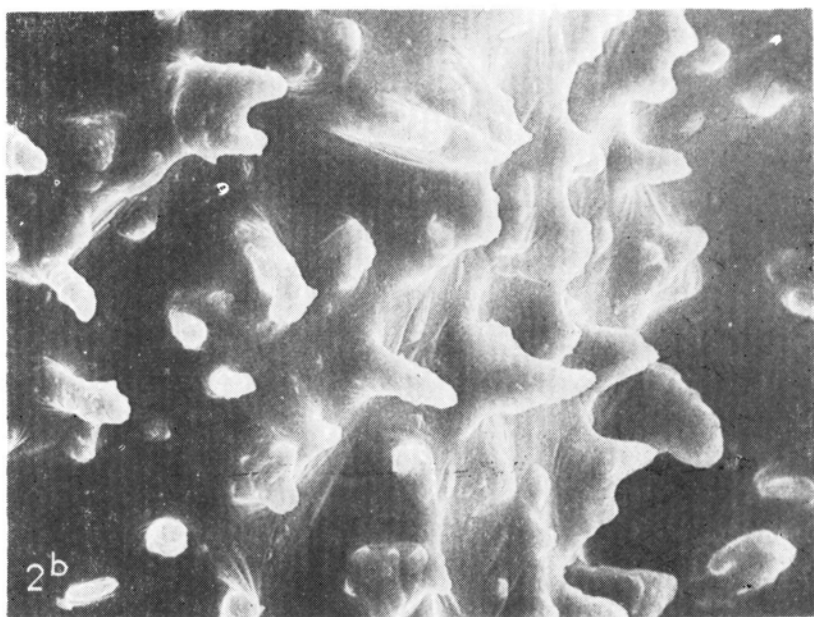
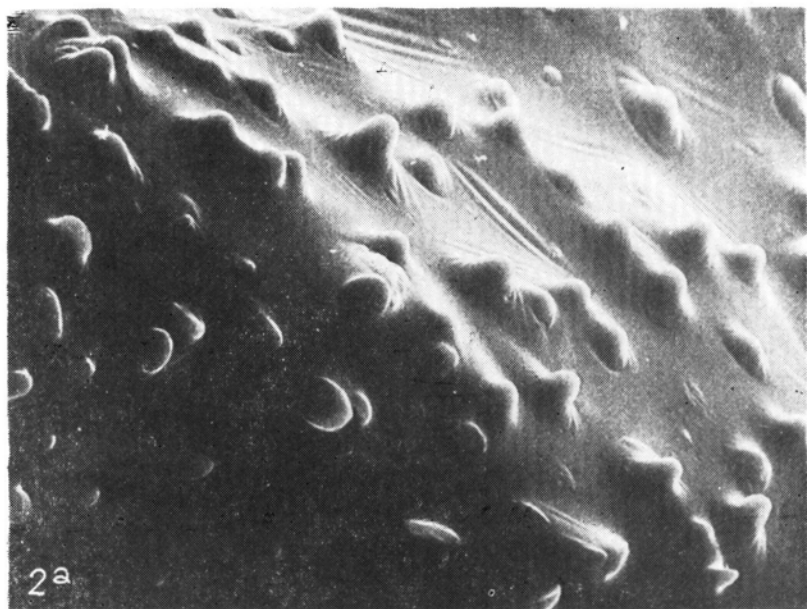


Fig. 2a. The surface of the central part of a younger flower stigma, showing small papillae ( $\times 400$ )

Fig. 2b. The surface of the central part of an older flower stigma, showing medium size papillae ( $\times 400$ )

Plate III

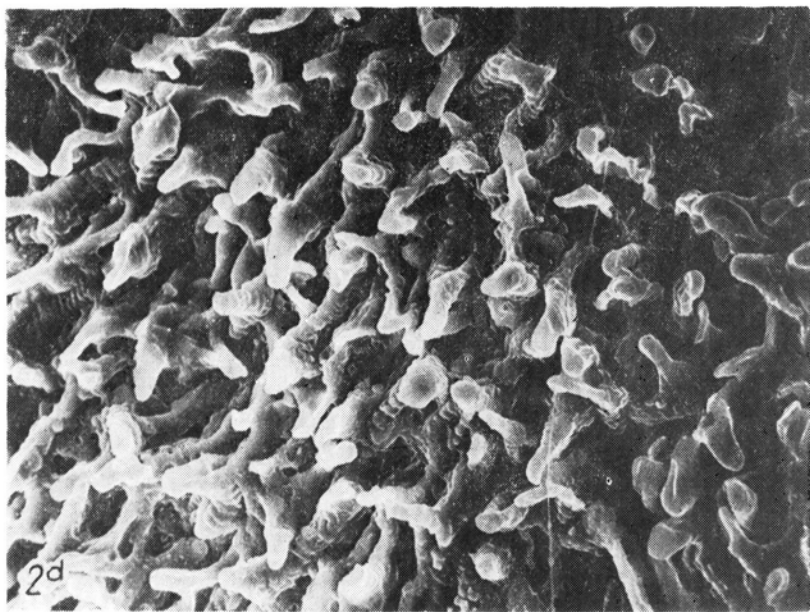
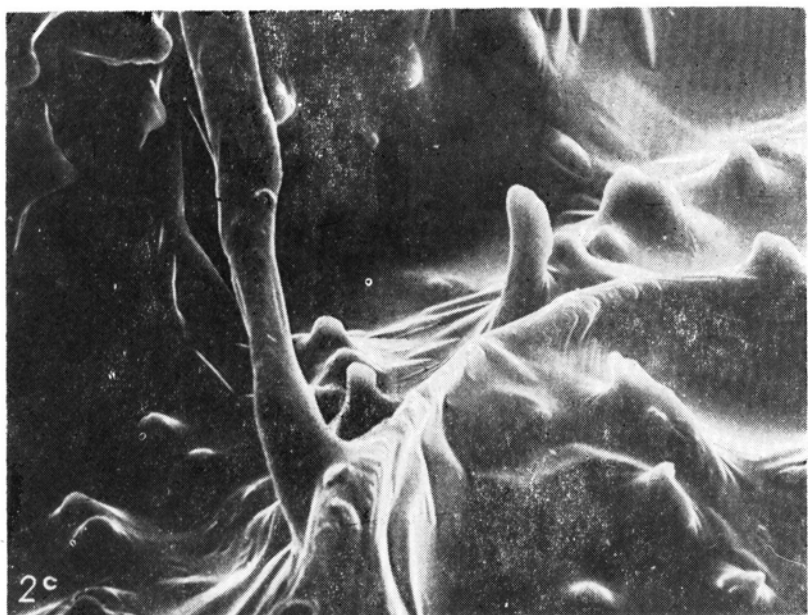


Fig. 2c. A detail of the central part of the stigma in an older flower, showing a very long hair ( $\times 400$ )

Fig. 2d. The surface of the stigma on an older flower, showing dense papillate hairs ( $\times 300$ )

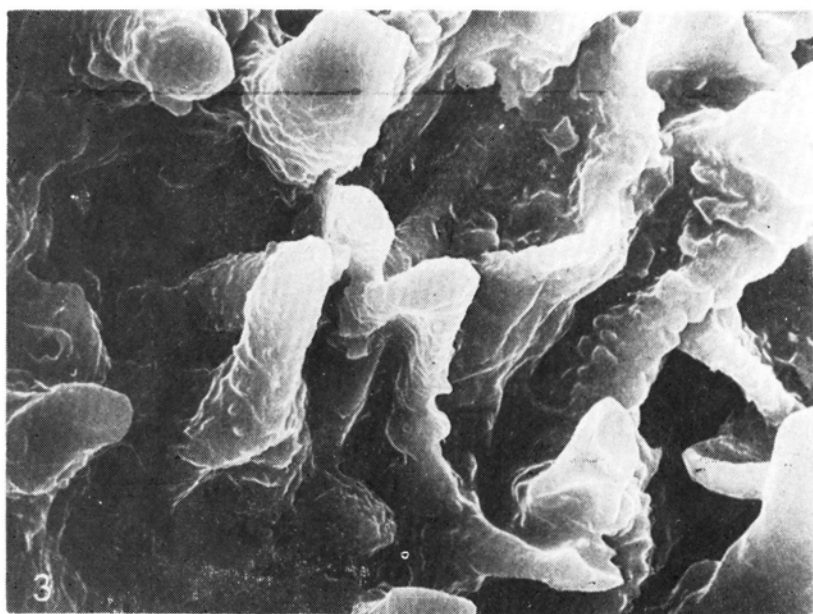
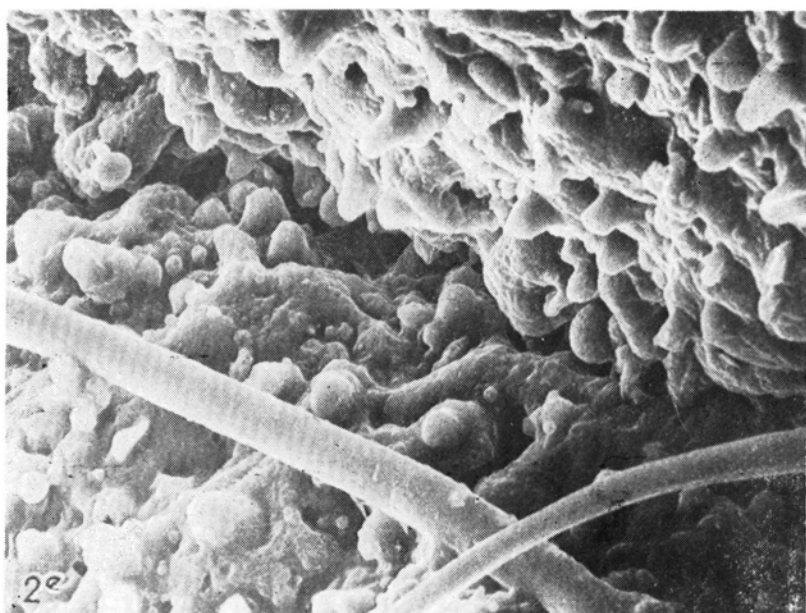


Fig. 2e. The surface of the central part of the stigma on an older flower ( $\times 400$ )

Fig. 3. The surface of the stigma of an older flower, showing the ultrastructure of the papillate hairs ( $\times 2000$ )