FLOWERING NEWSLETTER

My favourite flowering image

Peter K. Endress*

Institute of Systematic Botany, University of Zurich, Zollikerstrasse 107, 8008 Zurich, Switzerland

Received 4 January 2008; Accepted 8 January 2008

Abstract

The heuristic value of drawings in research is emphasized, based on a drawing of flowers of Eupomatia bennettii.

Key words: Drawings, Eupomatia, flowering, illustrations.

Nick Battey asked me to write about my favourite flowering image. The word ‘flowering’ implies a process, the time in the life of a flower when pollen is available and the stigma is receptive. The process of flowering has been studied in relatively few plants. I do not think that the process from opening to fading of a flower in Arabidopsis or Antirrhinum has been analysed in detail by developmental morphologists, developmental geneticists, or ecologists. Many changes can happen during anthesis of a flower, changes in colour and scent, and growth and movement of floral organs. These changes also contribute to the fascination of some ornamental flowers. They emphasize the ephemeral nature of flowers. One cannot keep a flower, one has to enjoy it in its best moment. A rose flower continuously changes its features during anthesis. The peak of its beauty for a rose lover may be a short episode in this development.

Which is my favourite flowering image? This is a tricky question. Should it be an image that conveys an unusual amount of information? Should it be an image that is aesthetically pleasing in a special way? Should it be an image that puzzled me and that I cannot forget so easily? I made a list of several possibilities for these different aspects and pondered them. Finally, I chose the third aspect and decided on an image that I drew myself and that puzzled me intensely when I drew it and was an eye-opener for me.

In the 1970s, I focused on a number of small, isolated, poorly known basal angiosperm families. One of them was Eupomatiaceae (Rix and Endress, 2007). I was somewhat familiar with the floral structure as I had studied fixed floral material and published the observations (Endress, 1977). When I was in the field in Australia and New Guinea in 1977 I was focusing on other families and therefore missed the flowering time of Eupomatiaceae. However, thanks to experienced gardeners, we could later cultivate Eupomatiaceae in the Botanic Garden of the University of Zurich. The first plant that came to flower was a specimen of Eupomatia bennettii. A young plant produces only a single flower in the first year it comes to bloom. Its flower bud opened in the morning of 5 February 1979. This was quite an event. I not only photographed the flower but, when it had opened and looked similar to the illustration in Curtis’s Botanical Magazine (Hooker, 1855) (under the wrong name Eupomatia laurina), which was the best available illustration of a flower at that time, I also began to draw it with pencil and pastel because this is the best way to familiarize oneself with a plant and to make critical observations (Fig. 1A). The anthesis process had never been studied before and was thus completely unknown. And now the surprise: a shocking experience! At first, I thought my capacity to recognize things three-dimensionally was hampered. When I checked organs just drawn a few minutes earlier they looked different, and this was the same with all the organs, although the aspect of the whole flower had not noticeably changed. It did not help to correct the drawing because the same frustration continued after the corrections. So I realized that all the organs were constantly moving. The flower was still in the opening process. I also realized that the reason why the overall image of the flower didn’t appear to change was because the organs were spirally arranged and thus all organs had the same divergence angles and the movement of the individual organs was highly co-ordinated. My first drawing (Fig. 1A) shows the flower at about 09.00 h. When I was certain that the flower was fully open, at about 14.00 h, I made a second drawing (Fig. 1B).

* E-mail: pendress@systbot.uzh.ch

© The Author [2008]. Published by Oxford University Press [on behalf of the Society for Experimental Biology]. All rights reserved. For Permissions, please e-mail: journals.permissions@oxfordjournals.org
Later, I made more detailed studies on the entire flowering process in the two species of *Eupomatia* known at that time (Endress, 1984). The flowers have an unusual architecture: they look as if they are inside out. They are perianthless but have a cap-like cover that is really a bract. The bract falls off like a calyptra when the flower first opens. The stamens are the outermost floral organs, followed by numerous petaloid inner staminodes and a gynoecium of numerous basally united, apically flattened carpels forming a platform with stigmatic knobs in the floral centre. Each flower performs a fixed programme of movements during anthesis. After the calyptra has detached from the floral periphery, the petaloid inner staminodes curve backward. When they are maximally recurved after several hours, the flower is fully open and is in the female phase. Later, the staminodes incurve again, blocking access to the gynoecium. The anthers open, and the flower comes into the male phase. The sequence of events is the same in all three species [a third one was described subsequently (Jessup, 2002)]. But the length of anthesis is different: one day in *Eupomatia laurina* and *E. barbata* and two or three days in *E. bennettii* (Endress 1984, 2003). The flowers are pollinated by tiny weevils, which also lay their eggs in the flowers. After the male phase, stamens and staminodes, which are united at the base, fall off as a unit and the larvae of the weevils develop in the nutritious staminodial tissue on the forest floor (Armstrong and Irvine, 1990).

The entire process of floral development up to anthesis has also been studied. The nature of the calyptra as a bract has been confirmed by comparative developmental morphology (Endress, 2003) and by molecular genetics (Kim et al., 2005). A developmental study of incipient flowers also showed how all the floral organs are positioned in a regular spiral (Endress, 2003), a reason for my puzzlement when I first drew the flower.

This essay on my drawing a flower that perplexed me while I was drawing it also allowed me to ask myself how I would characterize a good image in a scientific work. A good image is aesthetically pleasing and rich in information. It should convey information in a pleasant and simple way.

Last but not least, I would like to emphasize the great heuristic value of drawings, an ‘art’ that today is less valued than in earlier times. Of course, to do naturalistic drawings takes time, but the process of hand drawing can provide valuable insights into patterns or processes of nature, which can scarcely be achieved by merely looking at and analysing a picture taken by a camera or the SEM. Since I was at school I have made hundreds of drawings of plants. They taught me to see the three-dimensional structure of flowers like a landscape. Words are not able to convey an exact image of a complicated architecture. Pictures can convey patterns in nature much better than words (Rockwell and Lagarias, 2006; Ribisi et al., 2007). Words can only highlight certain features that an author views as important in a given context.

An interesting experiment was once made in a scientific drawing class. A student had to draw a plant of *Rhoeo spathacea* (Commelinaceae) based on a detailed descriptive text (Heller and Reble, 1990). He had not seen the plant before. Only after he had finished his illustration did he receive a live plant and drew it again. The two drawings look very different, and, looking at the first drawing it is difficult to recognize the plant (Heller and Reble, 1990).
Thus the value and necessity of illustrations is clear. They are primarily important to help the reader understand the content of a text. It is dismaying to see how sloppy images, and plates of images, are sometimes in publications. To compose good plates of images can be thought of as an art. Not only should each single image be good, but also the composition of a plate, which should be designed with an overall comparative context in mind. In this way plates of images should be valued as independent, integral parts of a publication and should not be seen just as assemblages of images supporting the text. This is not appreciated by some scientific journals, which require that the sequence of images should strictly follow the sequence of their citation in the text.

However, illustrations are not only important as a visual demonstration of structures in publications but also as instruments for the process of scientific discovery. ‘My favourite flowering image’ is of this category.

Acknowledgements

For successful cultivation of Eupomatia bennettii over many years, I especially thank the gardeners Leonhard Braun and René Stalder. I also thank Alex Bernhard for his help with the reproduction of the figure.

References