

XIV. COLLABORATION OF TAXONOMISTS AND DRAUGHTSMEN

The preparation of botanical drawings is a craft in its own right, and furthermore, draughtsmen are human beings. Even these simple truths are trodden down by the taxonomist who during a final hour hands the draughtsman a bundle of specimens and some hasty indications. Naturally the result is anguish and confusion. Let us therefore add some observations to improve the situation.

First: a botanical artist looks at plants with a different eye from the taxonomist - that's why he is an artist and not a scientist. Fortunately, some overlap exists, where the two can meet.

But (second): the artist cannot be supposed to know exactly what the taxonomist wants, and he can learn it only if the taxonomist himself has a clear idea of what he wants. This is not always the case, which is another reason for this article.

Third: the artist is dependent on the taxonomist. The latter has made the study and bears the responsibility. But there may be differences in opinion about hard facts. A good artist wants a clear understanding of and about plant structure and taxonomic importance.

Fourth: a satisfactory drawing represents a compromise between idea and reality. Painstakingly copying all the cracks in a dried leaf is an exercise in stupidity - unless it is the deliberate intention to depict a type or otherwise authentic specimen as such.

A drawing is prepared in five stages: 1) planning, 2) sketching, 3) assembling, 4) inking, 5) making the caption.

1) Planning involves the decision where the drawing is to be published, because this determines the format, discussed below. Also, of course, the 'policy' of drawing: is, for instance, every new species to be illustrated? Is a full page plate to be provided for every genus (like generally in the Flora Malesiana) or, in a large or diverse genus, for every subgenus or section? Is such a species selected because it is 'typical' (whatever that may be), or because it was never before depicted in widely available publications? Are series of details to be added to compare all species on characters hard to describe (e.g. all *Terminalia* fruits on cross section, Fl. Males. i 4: 561, 572, 582). Or are illustrations to be given especially to illustrate an identification key? (example: stipules in *Canarium*, Fl. Males. i 5: 257). At this stage, it is also good to decide to what extent elaborate structures are to be drawn, because compound leaves, large inflorescences, a cover of branched hairs or scales, and a fruit with spiny appendages take lots of an artist's time and

patience. The planning stage for an entire plant group should be completed first, in joint discussion with the artist, to whom the taxonomist should explain the structures, helped with a description, so that the artist understands them. A written plan should be drawn up, also including an outline of the structures which are taxonomically important, like the leaf tip in *Pandanus*, the stipules in *Canarium*, or the anthers in *Rinorea*. It may help an artist if in this stage he is shown fine drawings of the same genus in literature, is also provided with flower dissections (see p. 2527), with a description prepared by the taxonomist, with photographs or slides from the field, or is shown a living plant of the same genus in a greenhouse or garden.

2) Sketching. We make a difference between habit and details. Sketching the habit is usually the artist's own job. Details, which need flower analysis, may well be drawn in pencil by the taxonomist himself, like e.g. the late Dr. J.H. Kern did, who drew many Cyperaceae flowers under magnification, to be worked up later in ink by the artist.

Mirrors exist which, fitted onto a microscope tube, reflect on paper an image of a preparation; with some dexterity, a drawing can easily be made from it. The same can be done by means of a 'camera lucida'. A problem is here the magnification. First, it is hard to establish it; second, it may not fit the future degree of reduction in print. The simple petri dish with grid engraved in the bottom was described long ago in this Bulletin (no. 11, 1955, 431); the simple technique of drawing dissected flowers in herbarium taxonomy was recently again described and amplified a bit in this Bulletin (no. 29, 1976, 2527).

If sculptured bodies are to be drawn, like spiny fruit cupules of *Castanopsis* (Fagaceae), the artist may benefit much from a photograph of the same object printed at the required size, to copy it on transparent paper.

For such work and especially for drawing habits, Ruth van Crevel* worked out a way of sketching on Kodatrace: thin, very translucent sheets of stiff plastic material, 42 by 31 cm, available in packages of 10. One of the surfaces is rough, so that one can draw on it with a soft pencil; the other side is hard and shiny. A sheet is placed over the specimen, rough side up, and the sketch is made by tracing the outline of leaves, the nerves, etc. This sketch is then copied on a second sheet of Kodatrace (mirror-wise, lest the final drawing be an inverted copy of the original). In this second drawing, the leaves can be arranged in a more elegant

* Thanks are due to her for going over this text and contributing substantially to it.

way, cracks and holes in a leaf are left out, and damaged inflorescences are made complete, with the help of duplicates of the same number if necessary. This second, complete or, as one might say, 'reconstructed' drawing is then put (shiny surface up) onto the final piece of drawing-paper and transferred onto this by rubbing the hard, shiny surface of the Kodatrace with a very hard pencil.

This way of drawing a habit saves a great deal of time, and one is certain that the proportions of the leaves, branches, and other details are absolutely correct. It also has the advantage of being able to bring out characteristics of the lower surface of a leaf when this cannot be seen from the original specimen (see the drawing of *Picrasma* on the cover). One cannot do this with a photograph!

Kodatraceing works, of course, only at scale 1 : 1. For flexible magnifications, three ways are open. The first, preferred by Ruth van Crevel, is suitable for tiny plants (such as the *Lactuca subacaulis*, *Blumea* 23: 173). These are placed in a negative-holder of a magnifying apparatus, and a quick print is made, which can be Kodatraced. The technique is related to the reproduction of small fern-leaves as we depicted on the cover of Bulletin no. 20 (1965). The second way requires a piece of machinery of 90 by 90 by 120 cm, sold by Grant Production Company, 4 Rathbone Place, London W1P 2AY. An object is placed on a tray under a set of lamps. Both are movable up and down independently, for magnification and focussing. The upper surface consists of a glass screen, on which the image shows up, in magnifications $\frac{1}{4}$ to $3\frac{1}{2}$, ready to be copied on tracing paper. For the third way: mirror or camera lucida, see above. All these devices save copying time.

As for the magnification, it should be remembered that the reduction factor for the block-making must be known beforehand, to avoid absurd fractions like $\frac{4}{7}$ in the printed work. Added lines of x centimetres to indicate original size, though accurate, are often considered ugly. A reduction in print of the original to $\frac{2}{3}$ gives the most satisfactory result. This means that sketches be made at scale $1\frac{1}{2}$, 3, $4\frac{1}{2}$, 6, 9, 12, 15, $22\frac{1}{2}$, 30, 45. A main thing is that the habit and all details are drawn first in pencil on separate pieces of paper.

3) Assembling. During the next stage, the separate sketches are inspected by the botanist and, if approved, are tentatively arranged within the frame dictated by the format, so as to mark the sides, and to fill out the space elegantly.

As a general rule, the details are lined up at the bottom of the drawing, the habit spreading out above them. If there are more details than can be accommodated at the bottom, the lighter details may be placed higher and the heavier-set,

lower. If a drawing creates an artistic, harmonious impression, it is always cleverly assembled. Fine examples of well-assembled plates are those of the Ochnaceae, Fl. Males. 1 7: 111-116.

Here again, a fair number of steps lead to the quickest and best result. They are:

- i) draw the details in pencil on ordinary paper,
- ii) let the botanist examine them,
- iii) draw a rough outline on thin transparent paper in pencil,
- iv) cut out the sketches,
- v) take a sheet of thin transparent paper the final size and proportion, in relation to publication format,
- vi) place a Kodatrace containing the final habit drawing below it,
- vii) arrange everything into place; this may be a matter of millimetres,
- viii) if different species are represented in one plate, their outline sketches can quickly be done in different colours, with regard to the lettering,
- ix) fix these detail sketches into the paper in their proper position,
- x) put a new piece of transparent paper over the first, with 'architect's tape',
- xi) trace in rough outline the whole drawing on the upper sheet,
- xii) take off the upper sheet and place it on top of the definitive sheet of drawing paper,
- xiii) move the Kodatrace with habit drawing between the two other sheets, in the manner of a sandwich, into its proper place,
- xiv) remove the upper sheet, attach Kodatrace to the lower sheet, and rub over the Kodatrace with a hard pencil,
- xv) blacken the lower surface of the details with a B-pencil, put them back in their proper position,
- xvi) copy the details on the bottom paper by going over them with a 6H-pencil; surface features are later filled in with ink.

Of course, the details can be inked first and then glued onto the paper right away, but the result is disappointing in comparison with the above method.

4) Inking is again the artist's job. An old lady at Kew is here remembered - if only we could recall her name! - for placing her hand upon a small piece of knitwear whenever long narrow stems and leaves of e.g. Cyperaceae had to be drawn. With this device, she drew the lines marvellously fast and precise.

Shading is a topic of its own. Lines on the right hand and bottom side are to be thickened as if the light came from the upper left. In the kind of work we are discussing here, according to Ruth van Crevel's reasoning, all shading should be in lines. This is the specific potential of the pen. No stippling; it imitates lithography, a different technique of reproduction suited to shading by means of a pencil, but alien to Herbarium study. Reproduction with line-blocks, as are nowadays used in most publications, is open, exact, either black or white with nothing in between. This is the right technique for making illustrations from dried specimens. Nobody will use such material but a botanist, and for this reason any 'artistic' approach beyond unpretentious honesty would be wrong. Analysis, objectivity, scientific understanding are here in order; nothing is to be concealed, suggested, evoked, or imitated. It is only the pen that can bring true clarity to the job.

Letters or numbers for reference are drawn or glued so that the caption can be brief and clear. They should be placed in sequence from left to right, top to bottom, or clockwise, under avoidance of confusion. Comparative series of details should bear the same number as the species from which they are taken, or placed in alphabetical order.

5) Making the caption is to be done immediately, if possible in the editorial style of the future publication, mentioning the magnification (be clear to state whether in the present drawing or after reduction) and citing the specimens from which each element was taken, and in which Herbarium preserved. The caption is typed with a carbon copy; one is glued to the back of the drawing, the other is retained for the list of illustrations that is sent to the printer along with the text.

Returning to our point made at the beginning: a botanical artist as a human being, and a craftsman in his or her own right, wants to develop his or her talents. Since there is no formal education in this rare specialty, the artist is much dependent on professional botanists for this, unless he has found an inroad into botanical iconography to proceed on his own.

The first thing is, of course, to turn to Wilfrid Blunt, whose book The Art of Botanical Illustration (1950, Collins, London, reprinted several times) is inexpensive and a 'must' in this field. It provides a historical account of the main achievements, with beautiful illustrations, but proceeding from highlight to highlight, it provides little practical guidance beyond a 15 page appendix (p. 268-282) dating from 1869, with very sketchy illustrations, to instruct amateurs, and not dwelling on details of a flower or a seed.

While Blunt sides with the artist, Alphonse de Candolle sides with the taxonomist. His chapter 25 in La Phytographie, p. 312-329 (1880) is one of the rare treatises on the subject. He broadly comments on it in precise language. A drawing may tell much more than a description, as the popular saying goes, but cannot bring out a thin pubescence, for instance, nor can it properly indicate a very slight degree of attachment. He distinguishes and discusses three kinds of figures: i) those of actual plant specimens, ii) diagrammatical representations of a plant structure, iii) expressions of ideas or opinions, like affinities. Always a practical man, De Candolle discusses expensive against cheap reproduction techniques, and makes cost calculations. In Roxburgh's Plants of the Coast of Coromandel half the page area is blank, what a waste! He also cites collections of fine drawings as examples, and reminds us of Pritzel's important Iconum Botanicarum Index. And he ends with a good point, taken from Linnaeus: much as a plate has to convey, deductions from them can only be made in descriptions. L. Diels, who devotes 3 pages to the subject (in Abderhalden, Handbuch der biologischen Arbeitsmethoden xi 1, 1921, 92-94) adds little but a plea for accuracy. The taxonomist is indeed the one who is responsible for the accuracy of the figures in his publication. And a little checking will do no harm: in the Flora Neerlandica (i 6, 1964, 186, 198) two species of Juncus are clearly depicted with 5 petals!

More interesting is the history beyond the making of the colour plates from living plants in The Mountain Flora of Java (1972). On page 79, C.G.G.J. van Steenis describes how the Javanese draughtsmen Hamzah and Toha first made "an accurate pencil drawing of the selected specimen in which they then filled the colours of each part of its structure, sufficient for finishing the complete drawing later at Bogor. ... Their technique of painting was remarkable and obviously self-invented. In the pencil-sketch they started to fill the spaces with a thick white layer on top of which the other colours were laid; these were then subsequently very carefully removed with a just-wet paint brush so that the white came shimmering through to the degree they wanted. A professional painter, Mr. Spies, who observed this technique, told me that it was entirely new to him."

Our main concern here is, however, with line-drawings which clearly and expressively stand out. Such drawings were abundantly produced towards the end of the 19th century, and the Flora Brasiliensis, Engler's Die Pflanzenwelt Afrikas and Die natürlichen Pflanzenfamilien, as well as Baillon's Histoire des Plantes, and Wettstein's Handbuch der systematischen Botanik (not the reprint, of course), offer fine examples by the hundreds, which fully meet the need for both dia-

grams and longitudinal sections to understand flower and inflorescence structure. Translating these into modern representations, under omission of the cumbersome and illogical stippling is, however, not everyone's job.

The drawings of E.J.H. Corner well illuminate this point. Take those in The Natural History of Palms (1966), and note the flair with which he has picked out the essential features. With masterfully simple precision he figures the intricate spine pattern on the stem of a rattan, or the complexity of a palm inflorescence. Throughout, this work is an illustration of the well-known credo: less is more. This trimming of reality, down to the bare essentials which are important, is the very gift of the good taxonomist. Since Corner not seldom borrows drawings from others which he works up in his own style, the latter can be studied particularly fruitfully.

It is also highly instructive to see Corner's artistry develop. In The Wayside Trees of Malaya (1940), the gift is manifest, but the skill is lacking. Then comes Clavaria and Allied Genera (1950, preface dated 1946), and there is a world of difference in between. The skill has come, and with it the style that is his, through all his subsequent books: The Life of Plants (1964), The Cantharelloid Fungi (1966), The Natural History of Palms (1966), Boletus in Malaysia (1972), and The Seeds of Dicotyledons (1976). We may suppose that Corner used the war years - during which he was enabled to continue his botanical work at Singapore - to establish his style. Perhaps a certain amount of critical pondering is needed to achieve such a feat, which amounts to mastering the field between the Less and the More.

Comparing Corner's drawings, who are all self-arranged as well, with others also well done, with still others less expertly done, is most educating to a taxonomist to develop a sense for finesse and proportion that he can call his own. The historical achievements, mostly in watercolour, of a Dionysius Ehret, a Redouté, a Franz and Ferdinand Bauer, are of a perfection and a technicality no botanist can aspire to. Corner's drawings are plainly those of a taxonomist, with whom any botanist can identify himself. He also made copious use of published figures, redoing them in his own style, and thereby offering interesting stuff for comparison between the late 19th century and the present.

Style, while hard to define, is easy to recognize, and for this reason has much to add to a botanical publication. In style, the more articulate person is usually the more qualified authority. Such articulation is obtained by intense occupation with the subject, and usually in matters like proportion, arrangement, a professional artist may know better than a professional taxonomist. Denouncing or ignoring or overruling an artist who has articulate ideas on style and

presentation, can be extremely frustrating, the more so since an artist, unlike a scientist, is educated to perceive rather than to argue. Style being such a personal thing, a publication should be illustrated by one artist only, lest it receives a stamp of confusion. This point is shown in the *Flora Malesiana-Cyperaceae* (vol. 1 7) wherein a contrast between, e.g. page 483, 504, 594, 612, 614, 620, 626, 628 and most others is all too evident.

A few practical notes again. To each manuscript a list of illustrations belongs with caption, and full data about their editorial status. Whenever drawings have to be dispatched, a xerox copy is kept. Figures are also subject to correction in proof, for although their final quality will not show up then, the reduction may be wrong, blocks may be upside down, or interchanged, or be dirty. The quality of paper has to be settled on, beforehand. The printer is to return the blocks, well-labelled, coated to prevent corrosion, for re-use.

A neglect to budget publication costs at an early stage of a scientific project has often caused (near) fatalities. Burger's Seedlings book (1973) offers a recent example (see p. 2209-2210). The author, a qualified forestry engineer, was on the payroll in the Dutch East Indian Forest Service for fully 3 years in the 1920's. The printing expenses of his text and 180 line drawings would have been a trifle of his salary costs, but somehow the authorities were unprepared, and it was only after a remarkable rescue operation half a century later that the book could be published; otherwise the 3 years of work would have been wasted. Scores of fine drawings and particularly watercolours, are sitting in many Herbaria because an unforeseen lack of funds prevented their publication.

But once the publication has come from the press, the artist is entitled to at least one copy. And even this simple truth is sometimes trodden down by the taxonomist who .. etc.

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P.S. Seen announced but no more of it: Frances W. ZWEIFEL, A handbook of biological illustration, 132 p. illus. (1961, University of Chicago Press, 126 Buckingham Palace Road, London SW1), £ 1.90, paperb. "This book is designed to help the biologist who must be his own illustrator and the artist who is confronted with unfamiliar biological subjects."