

**A Puzzle in a Paintbox: A Painter's Solution to Ferdinand
Bauer's Colour Code for the *Flora and Fauna Graeca* 1786–1794**

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Supplementary Material

I. *Cyclamen latifolium*



Figure S1a

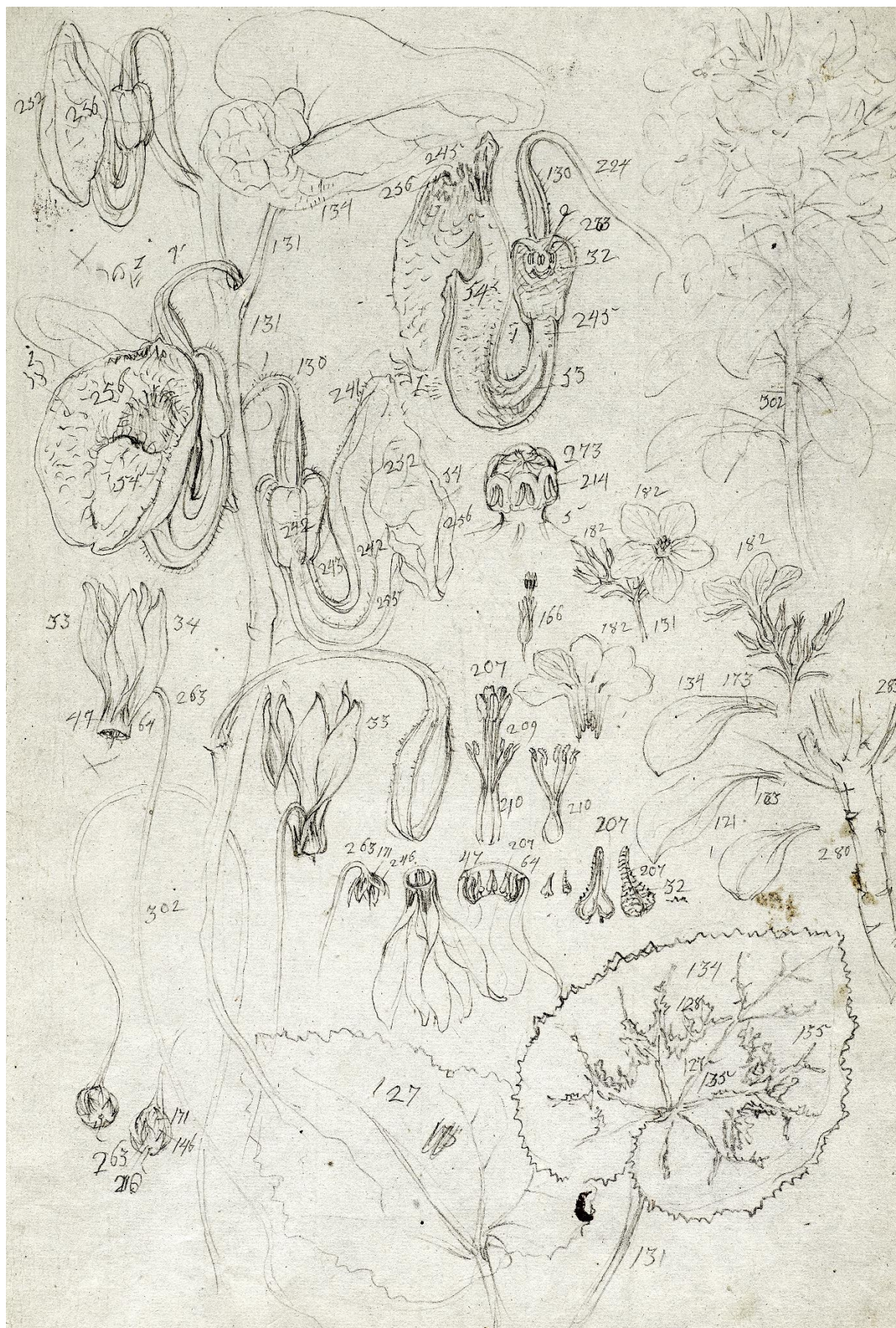


Figure S1b



Figure S1c

Figure S1. Ferdinand Bauer (1760–1826), *Cyclamen latifolium*. (a) Watercolour on paper, c. 1788. Sherardian Library, Bodleian Libraries, University of Oxford. MS. Sherard 244: fol. 176r. (b) Field study c. 1787. Sherardian Library, Bodleian Libraries, University of Oxford. MS. Sherard 247: vol. I., fasc. 8, fol. 25r. (c) Colour code analysis for *Cyclamen latifolium*.

Bauer's drawing of *Cyclamen latifolium* (Supplementary Fig. 1b) seems not to provide enough information for the resultant painting (Supplementary Fig. 1a), particularly evident in his depictions of leaf markings, and the shape of the stems. It is known that Philip Miller had a living sample growing in the Chelsea Physic garden (Lack with Mabberley, 1999), and it is possible that Bauer was able to go to see this.

Bauer uses Rose Madder in three different ways in the flowers, and chose also to use the much more powerful Carmine only when mixed with white. A further pink is found in the delicate edging of Brazil Wood.

I made experiments to see how Bauer could have arrived at the very dark green labelled 128 which appeared to confirm that the ending 8 meant 'Put underneath'. When Green Verditer was put down first and Indigo was washed over, a good match was achieved. Green Verditer is too opaque for a lower dark layer to show through it, so these two pigments

could not be used the other way round. Bauer could possibly have used Indian Ink as an alternative to Indigo (Dossie, 1758).

II. *Ophrys tenthredinifera*



Figure S2a

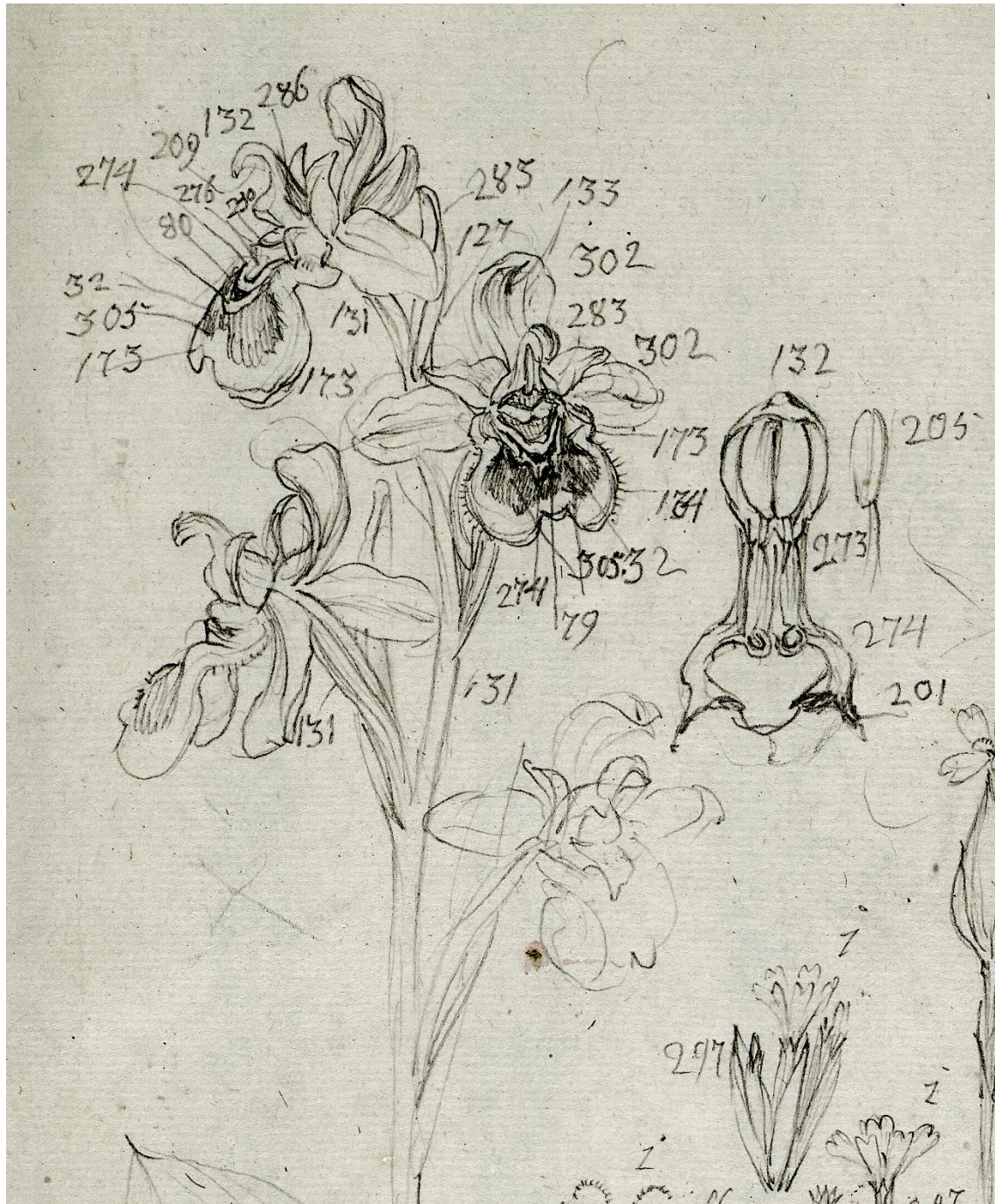


Figure S2b

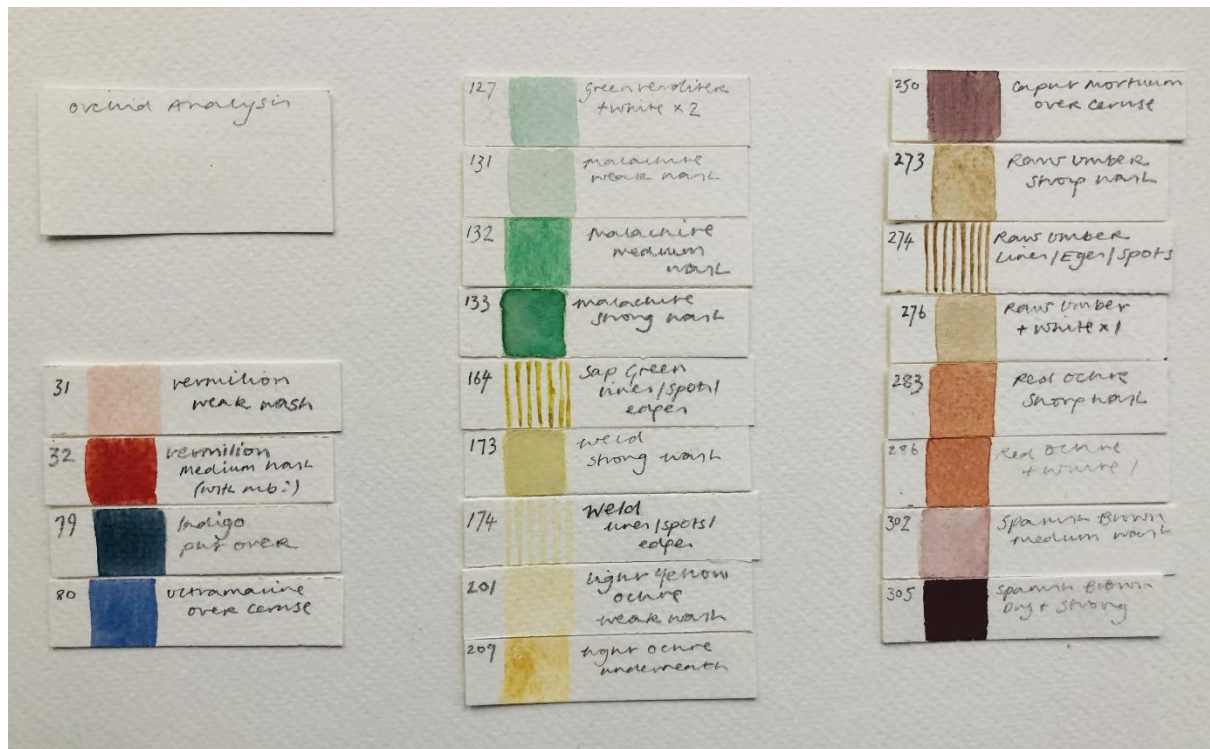


Figure S2c

Figure S2. Ferdinand Bauer (1760–1826), *Ophrys tenthredinifera*. (a) Watercolour on paper, c. 1793. Sherardian Library, Bodleian Libraries, University of Oxford. MS. Sherard 245: fol. 60r. (b) Field study, c. 1787. Sherardian Library, Bodleian Libraries, University of Oxford. MS. Sherard 247: vol. I, fasc. 6, fol. 27r (detail). (c) Colour code analysis for *Ophrys tenthredinifera*.

Among Bauer's drawn studies of plants, *Ophrys tenthredinifera* has an unusually large number of annotations (Supplementary Fig. 2b). Bauer may have wanted to mark many codes down because he was unfamiliar with the flower; or maybe because he was unsure about how well a sample brought back to Oxford might survive. It is interesting to see how Bauer was able to work up unfinished parts of his drawing into the complete painting.

Although almost all the notations in the orchid correspond with my interpretation of his code, I could not account for number 302 (Spanish Brown, Medium wash). Although when diluted, this brown becomes pink, it is slightly too dull to fit here, and would be a surprising choice, since Bauer had so many reds available in his paintbox. It may be that this number is not indicating the area in the painting I think it occupies, or my interpretation is incorrect. Possibly, Bauer thought to add Carmine or Rose Madder to the orchid flowers, to

accentuate their hue, and create a feeling of movement in the petals. In the wild this flower comes in many colours, including brown.

As seen elsewhere in his work, Bauer appeared to use Ceruse as an underlayer for pigments whose two or three figure codes end in 0. Here he used Ultramarine (number 8) over a light base, and does the same with Caput Mortuum (number 25). Both are made more luminous, as a result.

Bauer corrected one of his notations, and it is unclear whether this should read 164 or 174. This indicates the hairs on the lower edges of the flower, which may either mean lines of Sap Green, or Weld.

Figure S3a





Figure S3b

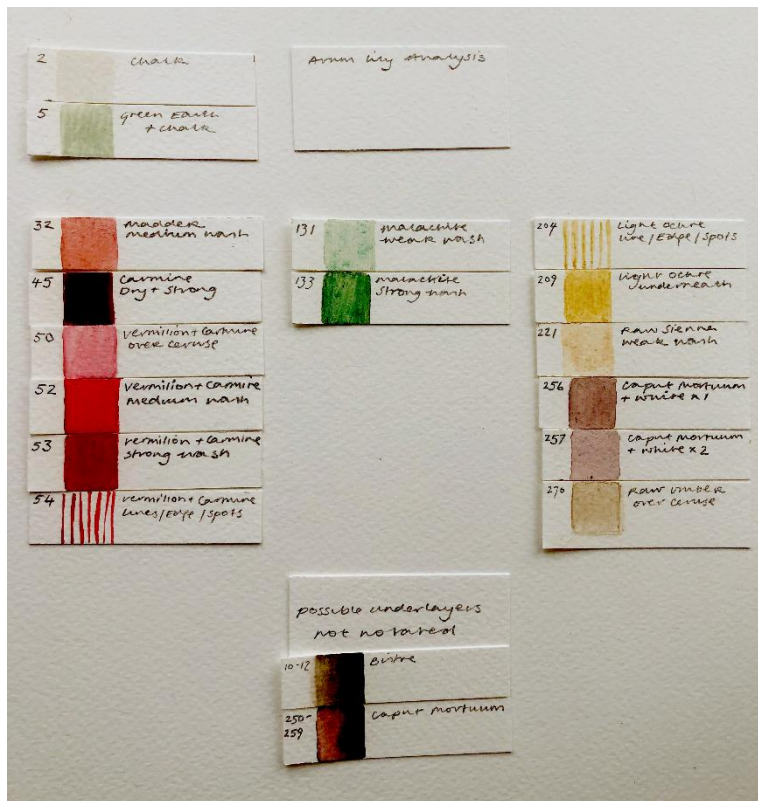


Figure S3c



Figure S3d

Figure S3. Ferdinand Bauer (1760–1826), *Arum Dioscoridis*. (a) Field Study, c. 1787. Sherardian Library, Bodleian Libraries, University of Oxford. MS. Sherard 247: vol. I, fasc. 6, 112 (detail). (b) Watercolour on paper, c. 1793. Sherardian Library, Bodleian Libraries, University of Oxford. MS. Sherard 245: fol. 56r. (c) Colour code analysis for *Arum Dioscoridis*. (d) Studio reconstruction of *Arum* (detail).

Bauer's painting of *Arum Dioscoridis*, like many others, shows the challenges in decoding his system, because there is much left unnotated in his drawing (Supplementary Fig. 3a). The top of the spathe appears to have a light-toned underpainting, indicated by numbers 50 (Carmine + Vermilion over Ceruse) and 221 (Raw Sienna Weak wash). However, Bauer does not tell us what he might have used in the much darker underpainting lower down, possibly made using Bistre or Caput Mortuum. Over this deep-toned layer, Bauer appears to have used Carmine + Vermilion in thin lines (54), to indicate texture, and as an edge to the spadix, and then chose to use dry and strong Carmine (45) to mark the spots on the surface of the spathe.

The spadix of the *Arum* lily is painted a very dark brown in the painting, but is left completely unshaded in the drawing, and is only marked 256 on the left-hand side. Many cross-checks suggested that code 25 was the violet-brown Caput Mortuum, which has a

particular deep, chalky opacity. After much experimentation, I realised the ending 6 could be an instruction to add white to this, providing a highlight in the spadix in the position indicated. 256 also appears in the curling side of the spathe. It is not clear whether the notation at the very top of the spathe should read 170 (Weld over Ceruse) or 270 (Raw Umber over Ceruse). The edge of the plant turns yellowish here, but of the two directions, the Raw Umber is a better fit.

The numbers at the very bottom of the spadix indicate some of Bauer's possible order of painting. The darkest tone showing hexagonal divisions, looks as if it was made in the first layer of painting, possibly in Bistre. On top of this, there is 209 (Light Yellow Ochre, Put over) and the markings of 2 (Washed Chalk). Bauer does not appear to have notated the little red circles, nor the small dark scratchings inside these.

The Malachite I used for codes beginning 13 contains a number of sandy impurities, a choice which added textural qualities. I was partially able to replicate the striated effect of the base of the *Arum* in Bauer's painting in a basic reconstruction, by capitalizing on this pigment's natural gritty quality (Supplementary Fig. 3d).

IV. Geum coccinium



Figure S4a



Figure S4b



Figure S4c

Figure S4. Ferdinand Bauer (1760–1826), *Geum coccineum*. (a) Watercolour on paper, c. 1788–1792. Sherardian Library, Bodleian Libraries, University of Oxford. MS. Sherard 242: fol. 112r. (b) Field study, c. 1787. Sherardian Library, Bodleian Libraries, University of Oxford. MS. Sherard 247: vol. I, fasc. 2, fol. 60r (detail). (c) Colour code analysis of *Geum coccineum*.

V. *Labrus carneus*

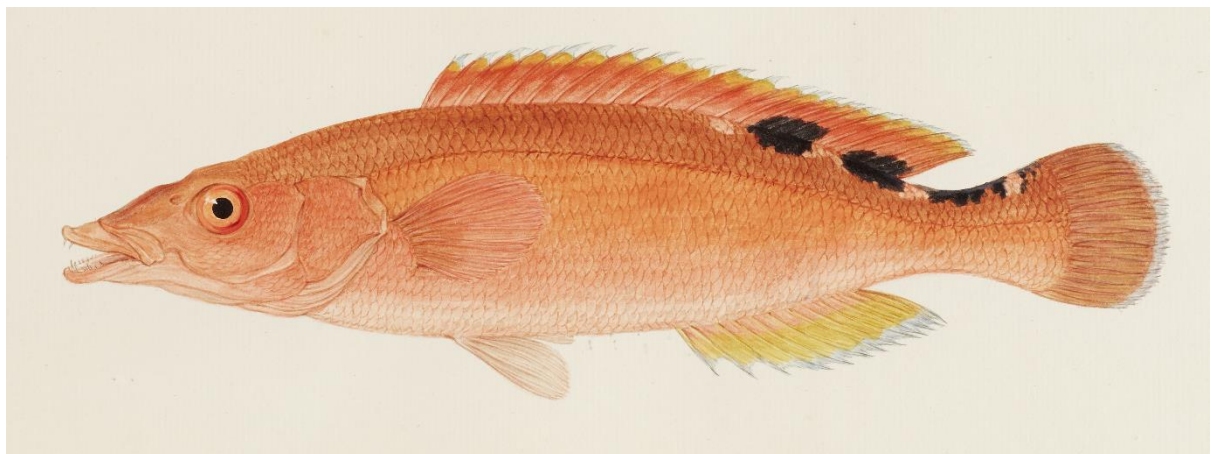


Figure S5a

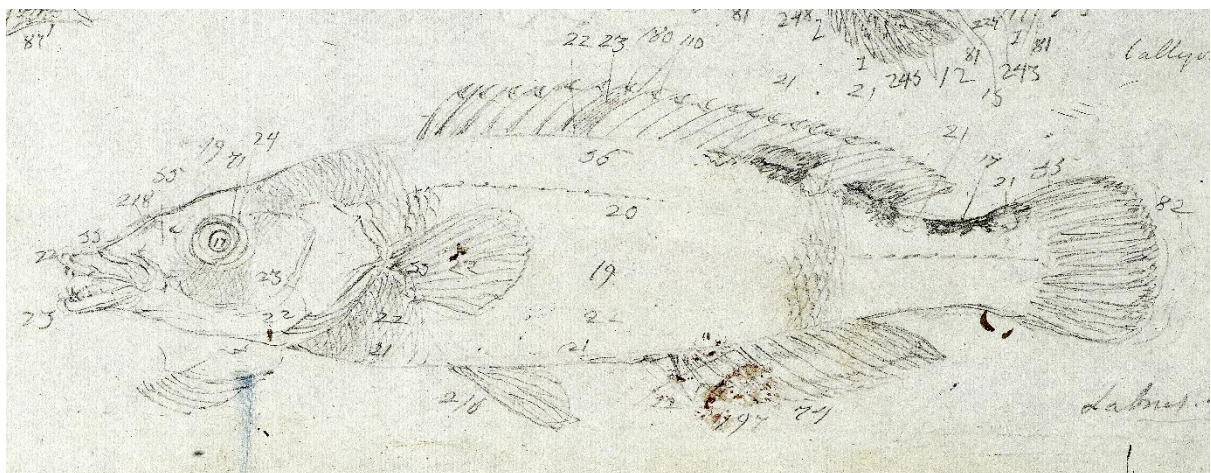


Figure S5b



Figure S5c

Figure S5. Ferdinand Bauer (1760–1826), *Labrus carenius*. (a) Watercolour on paper, c. 1792. Sherardian Library, Bodleian Libraries, University of Oxford. MS. Sherard 239: fol. 26r. (b) Field study, c. 1786-1787. Sherardian Library, Bodleian Libraries, University of Oxford. MS. Sherard 247: vol. II, fasc. 4, fol. 131r (detail). (c) Colour code analysis for *Labrus carenius*.

Here all the codes fit well with my colour key, where Bauer uses Minium (Red Lead) (19, 20), together with Vermilion at differing dilutions (21, 22, 23) and in lines (24) (Supplementary Figs. 5a and 5b). This use of two pigments with similar tone and hue adds vibrancy to the illustration, and their presence together is confirmed by a scientific analysis of this painting (Mulholland et al., 2017). Lamp Black at its darkest (17) is used on the eye of

the fish and on the markings on the top fin. There are three different uses of Indigo: as a weak wash; used dry and strong; and in the lines in the lower fins.

Water Colour Paintings by Ferdinand Bauer Examined in This Study

To facilitate reference, Bauer's paintings are named according to the catalogue listings in the Bodleian. See the digital *Flora and Fauna Graeca*:

<https://digital.bodleian.ox.ac.uk/collections/flora-and-fauna-graeca/>

The watercolour paintings illustrated are marked * (see also Lack with Mabberley, 1999, Appendix 2, pp. 234–263).

Plants

Arum Dioscoridis. MS. Sherard 245: fol. 56*.

Asperula rigida. MS. Sherard 242: fol. 184.

Aristolochia hirta. MS. Sherard: 245 fol. 31.

Atropa Mandragora. MS. Sherard 244: fol. 53*.

Colchicum latifolium. MS. Sherard 245: fol. 108 see plate XIII in Lack with Mabberley, 1999).

Cyclamen latifolium. MS. Sherard 244: fol. 176* (see illustrations 26 and 27 in Lack, 1999, pp. 19, 20).

Dianthus arboreus. MS. Sherard 241: fol. 116.

Galium graecum. MS. Sherard 242: fol. 201.

Galium pyrenaicum. MS. Sherard 242: fol. 196.

Geum coccineum. MS. Sherard 242: fol. 112*.

Gypsophila dianthoides. MS. Sherard 241: fol. 94.

Hippocrepis multisiliquosa. MS. Sherard 242: fol. 53.

Hypericum hircinum. MS. Sherard 241: fol. 172.

Iris florentina. MS. Sherard 245: fol. 69.

Iris germanica. MS. Sherard 245: fol. 70.

Iris Sisyrinchium. MS. Sherard 245: fol. 72.

Lupinus varius. MS. Sherard 242: fol. 20 (listed as D.323 in Lack with Mabberley 1999. See also Harris, 2007, p. 142).

Nerium oleander. MS. Sherard 244: fol. 8.

Ophrys tenthredinifera. MS. Sherard 245: fol. 60*.

Silene falcata. MS. Sherard 241: fol. 146.

Tulipa Sibthorpiana. MS. Sherard 245: fol. 79. (See Harris, 2007, pp. 71, 73, and Harris, 2021, pp. 98–101.)

Fish

Charax puntazzo. MS. Sherard 238: fol. 92.

Chrysophrys aurata. MS. Sherard 238: fol. 86.

Coryphaena hippurus. MS. Sherard 238: fol. 68.

Dactylopterus vulgaris. MS. Sherard 239: fol. 46.

Labrus carneus. MS. Sherard 239: fol. 26*.

Labrus mixtus. MS. Sherard 239: fol. 22.

Labrus pavo. MS. Sherard 239: fol. 23.

Platessa flesus. MS. Sherard 238: fol. 81.

Platessa vulgaris. MS. Sherard 238: fol. 80.

Serranus scriba. MS. Sherard 239: fol. 31*.

Serranus gigas. MS. Sherard 239: fol. 2.

Sparus. MS. Sherard 238: fol. 84.

Birds

Chough, Fregillus (Graculus). MS. Sherard 240: fol. 66.

Peregrine falcon, adult. MS. Sherard 240: fol. 5.

Spotted Fly-Catcher (M. Grisola). MS. Sherard 240: fol. 21.

Egyptian Vulture, adult (Neophron percnopterus). MS. Sherard 240: fol. 3.