BRILL

NUNCIUS (2022) 1–28

NUNCIUS
brill.com/nun

Corpuscular Conchology

Gautier's Shells and the Metaphorics of Mezzotint

Ruth Ezra | ORCID: 0000-0003-1335-824X
University of St. Andrews, St. Andrews, UK
rme5@st-andrews.ac.uk

Abstract

In 1741, Jacques Gautier d'Agoty asserted his position as the inventor of tri-color mezzotint, advertising his process in the pages of the *Mercure de France* December 1741, with an image of a *Drap d'or* shell. This article takes the shell as a case study to demonstrate one way in which Gautier's early artistic experimentation with print processes fed his later natural philosophical theorizing, which he published in the pages of his new scientific journal, the *Observations* (1752–1757). The burr of the *Drap d'or*'s copperplate, the stratigraphy of its tonal inking, and the corrosive action of its mordant informed Gautier's conception of shell discoloration as a process based on the collapse of a mollusk's surface texture and the movement of salts in and out of its pores. His first-hand experience of achieving mechanical color impressions with mezzotint furnished him with an artistic metaphor with which he could then comprehend a natural process.

Keywords

shells – mezzotint – color

In December of 1741, a notice appeared in the *Mercure de France* announcing that a thirty-year privilege had been granted to Jacques Fabien Gautier of Marseilles (1716–1785) for the production of color prints via a three-plate process.[1]

1 "L'art d'imprimer les Tableaux avec trois Planches," *Mercure de France*, December 1741, 2924–2929. For the *Mercure de France* (hereafter *Mercure*) as a commercial space, see Katie Scott, *The Rococo Interior* (New Haven: Yale University Press, 1995), 249–252. For journal announcements of prints in general, see Kristel Smentek, "'An Exact Imitation Acquired at Little

The editors of the journal included an extract from the royal order followed by an inventory of Gautier's now-protected wares. Available for immediate consumption were twenty-one *morceaux choisis*, from a sizable reproduction of a Salvator Rosa painting to a diminutive study of a single butterfly.[2] Rather than include a "detailed discussion" of the process being promoted, however, the editors opted for the concision of a visual argument.[3] They appended one of Gautier's impressions—a *Drap d'or*, or "cloth of gold" shell—to the pages of the advertisement itself (Fig. 1).[4]

The shell reproduced in the *Mercure* belonged to Joseph Bonnier de la Mosson (1702–1744), an aristocratic collector known for his cabinet of *curiosités*.[5]

Expense': Marketing Color Prints in Eighteenth-Century France," in *Colorful Impressions*, ed. Margaret Morgan Graselli (Washington: National Gallery of Art, 2003), 9–22. For Gautier see *Dictionnaire de biographie française*, vol. 15 (Paris: Letouzey et Ané, 1933–), 847; "Gautier D'agoty, Jacques Fabien, the Elder," *Benezit Dictionary of Artists*, published online 31 October 2011, https://doi.org/10.1093/benz/9780199773787.article.B00071621 (accessed May 7, 2022).

2 For a technical summary of Gautier's printmaking practice, see Ad Stijnman, "Introduction," in *Jacob Christoff Le Blon and Trichromatic Painting*, ed. Simon Turner, part I (Ouderkerk aan den IJssel: Sound & Vision Publishers, in co-operation with the Rijksmuseum Amsterdam, 2020), lxxiv–lxxxi; Dale R. Roylance, "The Eighteenth Century: Search for Tone," *Yale Art Gallery Bulletin* 27, no. 3 (1962): 29; John Gage, *Color and Meaning* (Berkeley: University of California Press, 1999), 140–143; and Florian Rodari, ed., *Anatomie de la couleur: L'invention de l'estampe en couleurs* (Paris and Lausanne: Bibliothèque nationale de France, 1996).

3 "Sans entrer dans un plus grand détail du progrès de cet Art & son utilité pour l'Histoire Naturelle … nous nous contenterons d'exposer ici aux yeux du Public un Enchantillon d'une Coquille, imprimée avec ses couleurs, & nous réservons à donner ensuite quelques Morceaux encore plus détailles & plus singuliers." *Mercure*, December 1741, 2927–2928.

4 *Conus textile* Linneaus 1758. Alan J. Kohn, "Type Specimens and Identity of the Described Species of 'Conus,' 1. The Species Described by Linnaeus, 1758–1767," *Zoological Journal of the Linnean Society* 57, no. 3 (1975): 160, https://doi.org/10.1111/j.1096-3642.1975.tb00816.x160 (accessed May 7, 2022). The shell is native to the Indo-Pacific, and at least one extant specimen was to be smuggled back to Europe as contraband in the seventeenth century: see "Conus textile shell from the wreck of the Dutch East India ship Witte Leeuw," 7.5 cm × 3.3 cm, before 1613, Rijksmuseum, NG-1977–220-W. For the print see Stijnman, "Introduction," lxxiv, lxxxi; Rodari, *Anatomie de la Couleur*, 109, cat. no. 87; Timothée Échot, "'Satisfaire la curiosité': les illustrations du Mercure de France (1724–1778)," in "Littérature, image, périodicité (XVIIe–XIXe siècles): Actes du colloque de Lausanne, les 15–16 novembre 2018," ed. Marta Caraion and Barbara Selmeci, *Fabula/Les colloques*, 2020, http://www.fabula.org/colloques/document6469.php (accessed May 7, 2022).

5 Contemporary appreciation of the quality of Mosson's collection was considerable: just the next year, selections of its shell groups appeared in Antoine-Joseph Dezallier d'Argenville, *L'histoire naturelle, éclaircie dans deux de ses parties principales, La Litholohie et la Conchyliologie* (Paris, 1742), plate 8; and an unillustrated catalogue of the whole collection was published three years later: Edme-François Gersaint, *Catalogue raisonnée, d'une collection … de feu Mon-*

FIGURE 1 Jacques Gautier [d'Agoty], *Coquille turbinite*, or *Drap d'or*, in *Mercure de France*, December 1741, tri-color mezzotint, 68×84 mm
HOUGHTON LIBRARY, HARVARD UNIVERSITY

Not only did the print expose the "eyes of the public" to Gautier's work, then, but it also delivered into their hands—via cheap paper surrogacy—a prized specimen otherwise inaccessible to anyone outside of Mosson's privileged circle.[6] Press and printmaker alike must have hoped that the *Drap d'or* would

sieur Bonnier de la Mosson (Paris, 1744). For the spread of shell collecting in Paris after 1735, see Bettina Dietz, "Mobile Objects: The space of shells in eighteenth-century France," *British Journal for the History of Science* 39, no. 3 (2006): 363–382; Daniela Bleichmar, "Learning to Look: Visual expertise across art and science in eighteenth-century France," *Eighteenth-Century Studies* 46, no. 1 (2012): 85–111.

6 *Mercure*, December 1741, 2927–2928; E.C. Spary, "Scientific Symmetries," *History of Science* 62

transfer some of the contemporary fervor surrounding shells to the inventory on offer, leading readers to conflate the collectible value of the individual specimen Gautier represented with that of the color impressions themselves.[7]

Just a few years prior, in 1736, the Parisian public had come out in droves to see a sale of curios by prominent merchant and picture dealer Edmé-François Gersaint (1694–1750). In his influential catalogue on shells, published the same year, Gersaint identifies two categories of appraisers: the *Physiciens*, seeking recreations of the mind ("recreatio mentis"), and the *Curieux*, those after recreations of the eye ("recreatio oculi").[8] What interest these two groups shared in physical specimens would have transferred easily to the evaluation of paper reproductions such as the *Mercure* mezzotint, allowing Gautier to capitalize on "populuxe"-chasing Parisians' curiosity towards the material-visual properties of shells.[9] Indeed, if the success of Antoine-Joseph Dezallier d'Argenville (1680–1765)'s *Conchyliologie*, from *L'histoire naturelle* (1742), is any indication, there was a wide audience at mid-century for printed images of mollusks; *L'histoire naturelle* went through three editions, collected by aristocrats and nascent scientific institutions alike.[10]

Recent scholarship on early modern conchology has drawn attention to striking convergences between the market for shells and that for prints.[11] Collectors in both domains sought variance amid multiplication, with rarity, con-

(2004): 1–46. As a surrogate the print comes under the category Cissie Fairchilds defines as populuxe, or "cheap copies of aristocratic luxury items." See Fairchilds, "The Production and Marketing of Populuxe Goods in Eighteenth-Century Paris," in *Consumption and the World of Goods*, ed. John Brewer and Roy Porter (London: Routledge, 1993): 228–248. For the printing capacity of mezzotints and pricing see Antony Griffiths, *The Print Before Photography: an introduction to European printmaking, 1550–1820* (London: The British Museum, 2018), 56–58.

7 Henry E. Coomans, "Conchology Before Linnaeaus," in *The Origins of Museums: The Cabinet of Curiosities in Sixteenth- and Seventeenth-Century Europe*, ed. Oliver Impey and Arthur MacGregor (Oxford: Clarendon Press, 1985), 120–138; Marisa Bass, Anne Goldgar, Hanneke Grootenboer, and Claudia Swan, *Conchophilia: Shells, Art and Curiosity in Early Modern Europe* (Princeton: Princeton University Press, 2021), with further bibliography.

8 For Gersaint and this distinction see Andrew McClellan, "Watteau's Dealer: Gersaint and the Marketing of Art in Eighteenth-Century Paris," *The Art Bulletin* 78, no. 3 (1996): 446.

9 Fairchilds, "Populuxe Goods," 228.

10 Bleichmar, "Learning to Look," 89. For collectors as a demographic, see also Peter Dance, *A History of Shell Collecting* (Leiden: Brill, 1986); and Coomans, "Conchology before Linnaeus."

11 Bleichmar, "Learning to Look," 97; Stephanie S. Dickey, "Shells, Prints, and the Discerning Eye," in Bass, Goldgar, Grootenboer, and Swan, *Conchophilia*, 155–175; Spary, "Scientific Symmetries."

dition, and beauty held up as key criteria for evaluation.[12] Moreover, as Anna Marie Roos has demonstrated in her work on the English naturalist Martin Lister (1639–1712) and his *Historiae Conchyliorum* (1685–1692)—the engravings for which were prepared by his daughters, Anna and Susanna—the making of early modern prints and the study of shell formation cultivated perceptual habits no less kindred than were the practices of connoisseurship driving both commodities markets.[13]

The present essay examines the relationship between conchology and printmaking in mid eighteenth-century France with regard to one intaglio technique in particular—color mezzotint. The *Drap d'or* also provides a case study with which to interrogate a broader question: how early moderns continued to use tacit artistic knowledge to understand natural processes well after, and in spite of, what Dániel Margócsy has characterized as a shift from an embodied artisanal epistemology to its textual codification in the form of intellectual property and Newtonian theory.[14] While graphic-arts specialists and historians of science have discussed Gautier's legal claim to the invention of tonal mezzotint at length, feedback loops between his print practice and his natural-philosophical theorizing remain comparatively unexplored by either field.[15]

I argue that Gautier's initial experiments with trichromatic printmaking, manifest in the *Drap d'or*, directly informed his later conjectures on the transient pigmentation of the print's subject—changes in coloration that arose during petrification or fossilization. Gautier would return to his 1741 shell motif

12 Dickey, "Shells, Prints, and the Discerning Eye," 167–168; Spary, "Scientific Symmetries," 27.

13 Anna Marie Roos, "The Art of Science: a 'Rediscovery' of the Lister Copperplates," *Notes & Records of the Royal Society* 66, no. 1 (2012): 19–40, doi: 10.1098/rsnr.2011.0053 (accessed May 7, 2022); Anna Marie Roos, *Martin Lister and his Remarkable Daughters* (Chicago: Chicago University Press, 2018).

14 Dániel Margócsy, *Commercial Visions: Science, Trade, and Visual Culture in the Dutch Golden Age* (Chicago: University of Chicago Press, 2014), 169. For the reception of Isaac Newton's *Opticks* (1704) in eighteenth-century France, see Ulrike Boskamp, *Primärfarben und Farbharmonie: Farbe in der französischen Naturwissenschaft, Kunstliteratur und Malerei des 18. Jahrhunderts* (Weimar: VDG, 2009), 25–62. For artisanal-based epistemologies and the role of artistic techniques in shaping knowledge, see Pamela H. Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago: University of Chicago Press, 2004) and for shells in particular, Noam Andrews, "The Space of Knowledge: Artisanal epistemology and Bernard Palissy," *RES* 65/66 (2014/2015): 276–288; Hannah Rose Shell, "Casting Life, Recasting Experience: Bernard Palissy's Occupation between Maker and Nature," *Configurations* 12, no. 1 (2004): 1–40.

15 Otto M. Lilien, *Jacob Christoph le Blon 1667–1741* (Stuttgart: Anton Hiersemann, 1985), 119–121; Bamber Gascoigne, *Milestones in Color Printing, 1457–1859* (Cambridge: Cambridge University Press, 1997), 8–17; Margócsy, *Commercial Visions*, 197–199; Stijnman, "Introduction," lxxiv–lxxv. A comprehensive monograph on Gautier remains a desideratum.

at a decade's remove, soon after founding the first illustrated scientific periodical in France, the *Observations sur l'Histoire Naturelle, sur la Physique et sur la Peinture*.[16] Writing in the new journal's pages in 1754, he responded to an epistolary debate on shell color raging in the *Mercure*.[17] As I demonstrate, Gautier's first-hand experience of rocking copperplates, mixing mordants, and layering opaque inks furnished him with artistic models for the physical transformations then under scrutiny in the popular press. The new technique Gautier used to produce the images for the *Observations* in turn helped readers to visualize arguments that had gone unillustrated elsewhere.[18]

What started out as a proprietary marketing image in the *Mercure* became, in the context of the *Observations*, an illustration to think with.[19] Whereas in its first appearance, the shell had only advertised the potential utility of color mezzotint for the study of natural history, its later inclusion in Gautier's scientific periodical realized this promise, functioning as an "epistemic image" that entered into an otherwise textual debate on shell coloration.[20]

In order to appreciate this shift in function, it will help to have a fuller account of the *Drap d'or*'s initial appearance in 1741. Two points deserve notice: why the image held interest for naturalists on the one hand and print collectors on the other; and why color mezzotint opened up new possibilities for the rendering of shells in particular. As will become apparent, the reception of shells and prints merged not just at the level of the connoisseurial gaze but also in the rhetoric that framed accounts of either object's miraculous creation.

16 Hereafter the *Observations*. The periodical lasted five years, from 1752–1757. Gascoigne, *Milestones in Color Printing*, 13–15.

17 "Lettre au sujet des Os d'une Renne, & concernant la décoloration des Coquilles fosilles," *Observations*, September 1754, 126–129.

18 Compare Marlise Rijks's "process appreciation," what she defines as early modern collectors' keen appreciation for artisanal practices that could be "analogously linked to natural transformation processes or metamorphoses." Marlise Rijks, "'Unusual Excrescences of Nature': Collected Coral and the Study of Petrified Luxury in Early Modern Antwerp," *Dutch Crossing: Journal of Low Countries Studies* 43, no. 2 (2019): 127–156, defined on 129.

19 On visual thinking in seventeenth- and eighteenth-century Europe, see especially Susanna Berger, *The Art of Philosophy: Visual Thinking in Europe from the Late Renaissance to the Early Enlightenment* (Princeton: Princeton University Press, 2017) and Henrike Grootenboer, *The Pensive Image: Art as a Form of Thinking* (Chicago: Chicago University Press, 2021).

20 For the nebulous category of epistemic images see Lorraine Daston, "Epistemic Images," in *Vision and its Instruments*, ed. Alina Payne (University Park, Penn.: Penn. State University Press, 2015), 13–35; and Alexander Marr and Christopher P. Heuer, "The Uncertainty of Epistemic Images: Introduction," *21: Inquiries into Art, History, and the Visual* 1, no. 2 (2020): 251–255.

1 The Ur-*Drap d'or*

One can well imagine cut-outs from the *Mercure* populating the paper cabinets of amateur naturalists less prosperous than Mosson. Yet given the tendency today to associate Gautier with his later, life-size anatomical prints—chief among them the so-called "Flayed Angel" from his *Myologie Complète* (1746)—his 1741 offering of a single mollusk seems a modest gesture, hardly in keeping with what hindsight reveals to have been his grand ambitions for the medium.[21] Gautier himself rather played up the humble origins of his color process. He later claimed that the *Mercure* publicity print (which he referred to as the *Coquille turbinite*) represented his very first attempt at tonal mezzotinting. In a letter to Claude Gros de Boze (1680–1753) published in the July 1749 issue of the *Mercure*, Gautier even cited 1737 as the year of the print's creation: a suspiciously early, and likely revisionist, dating given that Gautier only studied with Jacob Chrisoph Le Blon (1667–1741)—the true inventor of three-plate color mezzotinting—in 1738.[22] What is certain is that the shell emerged from experiments with a new technique that Gautier began under Le Blon's watch.[23]

Mezzotint is an intaglio method whereby copperplates are worked over with a curved, serrated blade called a rocker.[24] The back-and-forth action of the rocker ploughs a field of bite marks (burr) into the copper; when the metal is inked, these pits together register as a tonal ground. To achieve highlights, the printmaker must remove individual burrs from the plate with a scraper and burnisher, thereby creating white space. Subtler modulations in the height of burr result in halftones—the eponymous *mezzo-tint*.

---

21 Gautier d'Agoty, *Myologie complette en couleur et grandeur naturelle, composée de l'essai et de la suite de l'essai d'anatomie, en tableaux imprimés: ouvrage unique, utile & nécessaire aux etudians & amateurs de cette science* (Paris: Gautier, 1746), plate 14, 46 cm × 60 cm. For the printing process and materials necessary for this large illustration, see Isabella Haldemann, "Les débuts de la quadrichromie: l'atlas anatomique Myologie complette en couleur et grandeur naturelle de Jacques-Fabien Gautier d'Agoty," *Zeitschrift der Schweizerischen Bibliophilen- Gesellschaft = revue de la Société Suisse des Bibliophiles* 57, no. 2/3 (2014): 93–111; Grasselli, *Colorful Impressions*, 45, cat. no. 3.

22 *Mercure*, July 1749, 158–172. Lilien, *Jacob Christoph le Blon*, 120–121; Rodari, *Anatomie de la Couleur*, 109; Graselli, *Colorful Impressions*, 45; Stijnman, "Introduction," lxxiv–lxxv.

23 Le Blon passed away suddenly in May of 1741. On 5 September of that year, not four months after, Gautier, in the interest of reaping dividends from his teacher's invention, succeeded in securing the necessary royal privilege to continue his practice. For Gautier after Le Blon, see Lilien, *Jacob Christoph le Blon*, 119–121; Gascoigne, *Milestones in Color Printing*, 8–17; Margócsy, *Commercial Visions*, 197–199; Stijnman, "Introduction," lxxiv–lxxv.

24 Carol Wax, *The Mezzotint: History and Technique* (New York: Harry N. Abrams, 1990).

Le Blon's innovation lay in harnessing the mechanics of this process to reproduce not just tone but color as well.[25] Working backwards from the hues of oil paintings that he had initially set out to copy, Le Blon hit upon the principle of color separation: the possibility of dividing any given hue into distinct proportions of its primary constituents, which could then be recombined through subtractive color mixing. It only took three plates, inked respectively in blue, yellow, and red, to mimic a full palette—provided, that is, that their interdependent impressions be superimposed on a single sheet of paper.[26] As he perfected his technique, Le Blon sometimes inserted a fourth, black-inked plate, the better to reproduce darker palettes. He also varied the transparency of his inks in imitation of oil glazes and, on occasion, touched up his printed colors with hand-painted white highlights.

After Gautier arrived in Paris from Marseilles in 1737, he appears to have heard about Le Blon through a mutual contact, the natural philosopher Louis-Bertrand Castel (d. 1757).[27] Gautier would later spend six weeks apprenticing in Le Blon's shop before quitting to strike out on his own. From Le Blon he learned the fundamentals of the trichromatic process, but his work fell short of the elder printmaker's subtlety and refinement. Gautier's inks are much more opaque than Le Blon's and his rocked grounds, noticeably coarser.[28]

In the case of the *Drap d'or*, Gautier prepared three separately incised plates of identical dimensions. He printed each of these matrices on the same paper support and in direct succession (the image in the *Mercure* measures 6.8×8.4 cm). He inked the first with a yellow-brown bistre (this, in place of Le Blon's usual blue), the second with a darker brown, and finally, a red.[29] He eschewed a black key plate or base layer, the so-called fourth primary, which he later erroneously argued had been his contribution to Le Blon's process.[30] For the last plate, Gautier traded the granular texture of the rocker for a finer linear intaglio. These additional incisions lend greater fidelity to the print, capturing

25 The following paragraph summarizes the technical descriptions of Stijnman, "Introduction."

26 For primary colors in eighteenth-century French painting and the arts, see Boskamp, *Primärfarben und Farbharmonie*, 79–113.

27 *Mercure*, July 1749, 163–164; Stijnman, "Introduction," lxxv.

28 Stijnman, "Introduction," lxxix; *Mercure*, July 1749, 171. Stijnman suggests that rather than mimic the successive glazes of oil painting, and thereby attempt to exploit the transparency of printing inks, Gautier instead used the example of textile printing on calico, which he may of observed in Marseilles, to conceptualize the layering of plates in his own mezzotint impressions. Stijnman, "Introduction," lxxxi.

29 Stijnman, "Introduction," lxxiv, lxxxi.

30 *Mercure*, July 1749, 163–164.

the shell's superficial textile pattern and translating the metallic flicker of its "weft" to the stubborn flat of the page.

Previous literature describes the foremost intaglio as the work of a burin.[31] Troughs dug so laboriously would sit deeper in the copperplate than the recesses of a rocker's all-over dots. Ad Stijnman, however, has recently catalogued the red-inked plate as an etching, meaning that Gautier cut the copper not through the painstaking work of his hand but chemically with a mordant, having first drawn the pattern on a wax resist with an etcher's needle.[32] This revised account of the print's making, which I accept here, also implies that nitric acid played a direct role in the shell's rendering. I shall address the salience of this caustic substance below.

Whether or not the *Drap d'or* was in fact the ur-image of Gautier's color process, his retrospective ascription of a point of origin to the work stands as a compelling rhetorical commitment. Shells were widely understood in the early modern period as *acheiropoieta* of nature: objects made not by human hands but by the divine.[33] As such, they were well suited to offer visual testimony to the mechanical process of color mezzotint, as Gautier intuited. The 1741 advertising print functioned analogically to, and in direct competition with, another "miraculous" image: the Sudarium of St. Veronica, which Le Blon confessed had been his inaugural subject for trichromatic printmaking (ca. 1719), reproduced from his own painting (Fig. 2).[34]

---

31 Rodari, *Anatomie de la Couleur*, 109, cat. no. 87.

32 Stijnman, "Introduction," lxxiv. For mixed method mezzotints in general see Wax, *The Mezzotint*, 100.

33 Anne Goldgar, "For the Love of Shells," in *Conchophilia*, 11–12; Marisa Anne Bass, *Insect Artifice: Nature and Art in the Dutch Revolt* (Princeton and Oxford: Princeton University Press, 2019), 224–227. Bass cites the sixteenth-century art theorist and painter Luca de Heere's description of fossilized stones (likely including petrified shells) as *van gheen menschen handen*, what she argues is a clear evocation of *acheiropoieta* by de Heere, a Calvinist. Philibert van Borselen similarly evokes the image not made by human hands in his *Strande oft Ghedichte van de schelpen, kinckhornen, ende andere wonderlicke Zeeschepselen* (Amsterdam, 1614), where he compares shells to porcelain: "Is t'Porceleyn gelijck, door geener handen konste/ Geplaestert noch gevormt, maer wt s'Naturen gonste/ Den menschen toegeschickt …" (p. 23)." See R.W. Scheller, "Rembrandt en de encyclopedische kunstkamer," *Oud Holland* 84, no. 2/3 (1969): 120. For the related origin story of the shell as *lusus naturae*, or joke of nature, especially in the work of the Italian Jesuit naturalist Filippo Buonanni (1638–1725), see Paula Findlen, "Jokes of Nature and Jokes of Knowledge: The Playfulness of Scientific Discourse in Early Modern Europe," *Renaissance Quarterly*, 43, no. 2 (1990): 297, 300, 302, 305–306, 318, 323; Filippo Buonanni, *Ricreatione dell'occhio e della mente nell'osservatione delle chiocciole* (Rome, 1681).

34 Lilien, *Jacob Christoph Le Blon*, 30–32, 130, fig. 46; Turner, ed., *Jacob Christoff Le Blon and Trichromatic Painting*, 20, cat. no. 8; Stijnman, "Introduction," lxxxiv. Ironically, Le Blon

FIGURE 2 Jacob Christoph Le Blon, *Head of Christ on the napkin of the St. Veronica*, ca. 1721, color mezzotint, 88×103 mm
BIBLIOTHÈQUE DE L'INSTITUT NATIONAL D'HISTOIRE DE L'ART, COLLECTIONS JACQUES DOUCET, EA LE BLON 1

In the late Middle Ages, the Sudarium was understood to be the result of divine contact; by the early modern period, the topos of the Holy Face had also become a token of artistic success, one that elided the artist's hand with God's touch.[35] The icon in Le Blon's mezzotint self-consciously invites close scrutiny of both the manner and the matter of its making. Gautier's ur-image, the *Drap d'or*, tempts similar inspection. He conflates a conundrum of art practice—

added hand coloring on one impression of the Sudarium, an intervention Gautier was quick to criticize. *Mercure*, March 1745, 145.

35 An earlier example of this theme in printmaking is Claude Mellan's 1649 *The Holy Face*, engraving. See Rebecca Zorach, "A Secret Kind of Charm Not to be Expressed or Discerned: On Claude Mellan's Insinuating Lines," *RES: Anthropology and Aesthetics*, 55/56 (2009): 235–251. For the Sudarium as *acheiropoieton*, see especially Herbert Kessler, *Spiritual Seeing: Picturing God's Invisibility in Medieval Art* (Philadelphia: University of Pennsylvania Press, 2000); Herbert Kessler and Gerhard Wolf, *The Holy Face and the Paradox of Representation* (Bologna: Nuova Alfa, 1998); and Bissera V. Pentcheva, "The Performative Icon," *The Art Bulletin* 88, no. 4 (2006): 631–655.

the three-plate color-separation process—with a conundrum of nature: the composition of shells, a topic that, after attracting much attention in late seventeenth-century natural theology, remained under debate well into the next century.[36] The 1741 shell at once celebrates God's ingenuity and presents an alternative origin story for a man-made mechanical process to whose invention Gautier lay claim.

2 The Challenge of the 'Coquille'

There is a sense in which the history of printmaking answers the question, why start with a shell? From a technical perspective, the "naturalistic" representation of a mollusk's stratified outer casing was a problem not yet adequately solved in the early eighteenth century by historical printing methods.[37] To be sure, engraving, etching, and drypoint sufficed to convey morphological aspects like surface pattern, sutures, and septa upon which naturalists relied for their pre-linnaean classifications.[38] Yet all three intaglio techniques lacked the tonal means to communicate a shell's lustrous gloss or granular composition, let alone its color.[39] Whereas the fine manner of Johann Gustav Hoch's watercolor *Twenty Tropical Shells* (ca. 1726–1779) manifests the greater fidelity possible with paint and brush, printmakers who attempted to capture the true texture of a shell's calcareous exterior continually confronted the limits of their medium's linear grammar.[40]

Wenceslaus Hollar (1607–1677), for all his efforts to achieve truth-to-tone through minute hatching, would have the viewer of his series of etched shells (ca. 1644–1652) believe that such exteriors conform to a linear grid.[41]

36 Dickey, "Shells, Prints, and the Discerning Eye," 155; Spary, "Scientific Symmetries," 19.

37 On "naturalism" in natural history illustration, see Sachiko Kusukawa, *Picturing the Book of Nature: Image, Text, and Argument in Sixteenth-Century Human Anatomy and Medical Botany* (Chicago: University of Chicago Press, 2012); Florike Egmond, *Eye for Detail: Images of Plants and Animals in Art and Science, 1500–1630*. (London: Reaktion Books, 2017).

38 Roos, "The Art of Science," 27. On the various potentialities of different intaglio techniques used in seventeenth-century illustrations of natural philosophical texts see Karin Leonhard and Robert Felfe, *Lochmuster und Linienspiel: Überlegungen zur Druckgrafik des 17. Jahrhunderts* (Freiburg i. Br.: Rombach, 2006).

39 For the comparative merits of the mezzotint technique in general, see Gerdien Wuestman, "The Mezzotint in Holland: 'easily learned, neat and convenient'," *Simiolus* 23, no. 1 (1995) 63–89; Leonhard and Felfe, *Lochmuster und Linienspiel*, 56–60.

40 Rijksmuseum, RP-T-1949–43. http://hdl.handle.net/10934/RM0001.COLLECT.233105, accessed April 8, 2021.

41 Rijskmuseum, RP-P-1920–2766. http://hdl.handle.net/10934/RM0001.COLLECT.33007, ac-

The much-copied later etching of the same subject (1650) by Rembrandt van Rijn (1606–1669)—as a still life, an anomaly in his print oeuvre—perhaps comes closest to anticipating the tonal range and velvety black background mezzotint soon made possible.[42] Upon closer examination, even the vigorously hatched surface of Rembrandt's etched shell fails to convince in its evocation of fused granular matter (its chirality is also sinistral rather than dextral). The publication of a number of illustrated volumes on shell collecting in the early eighteenth century brought no real refinement in the ability of printmakers to capture the porous outer texture (Fig. 3).[43] To a certain extent, this suited naturalists just fine, provided that what they were after was not total material fidelity so much as visual clarification of a specimen's external structure or internal anatomy.[44]

For Gautier, more was at stake philosophically, and materially, than the shell's significance as a limiting case for the possibilities of the print medium. As his treatise, *Observations sur la peinture* (1753), would later make plain, Gautier was committed to reducing principles of art to natural-philosophical theory.[45] The mechanical rhythm of the mezzotint's pocking rocker attracted him because of its ostensible elimination of the artist's hand. Gautier likened

---

cessed April 8, 2021. "Keuze uit de annwinsten," *Bulletin van het Rijksmuseum* 40, no. 1 (1992): 102–103; Karin Leonhard, "Who commissioned Hollar's shells?," *Simiolus* 37, no. 3/4 (2013/14): 227–239.

42 Ursula Hoff, "Rembrandt's Shell—conus marmoreus L.," *Art Bulletin of Victoria* 16 (1975): 16–20. The impression with black background is the second state; the first retains the white ground of the paper. For both impressions and selected bibliography, see the extensive online catalogue entry for 1868,0822.672, at the British Museum Collection Database, https://www.britishmuseum.org/collection/object/P_1868-0822-672, accessed April 8, 2021. For Rembrandt and tone, see Clifford S. Ackley, "Printmaking in the Age of Rembrandt: the quest for printed tone," in *Printmaking in the Age of Rembrandt* (Boston: Museum of Fine Arts, 1981), xix–xxvi. For Rembrandt's participation in a veritable competition to out-shell his fellow printmakers, see Erik Hinterding, Ger Luijten, and Martin Royalton-Kisch, *Rembrandt the Printmaker*, exh. cat. (Amsterdam: Waanders Publishers for Rijksmuseum, 2000), 259–262. See also Karin Leonhard, "Die Muschel als symbolische Form, oder: Wie Rembrandts 'Conus marmoreus' nach Oxford kam," in *Vom Objekt zum Bild*, ed. Bettina Gockel (Berlin: Akad.-Verl., 2011), 122–155.

43 These include Buonanni, *Ricreatione dell'occhio* (Rome, 1681), with the *Drap d'or* illustrated as no. 135; Niccolo Gualtieri, *Index Testarum Conchyliorum* (Florence, 1742); and Albert Seba, *Locupletissimi rerum naturalium thesauri accurata descriptio* (Amsterdam, 1734–1765). These and other literature are discussed with extensive bibliography in Coomans, "Conchology Before Linnaeaus."

44 See discussion of Lister's criteria for the plates of his *Historiae Conchyliorum* (London, 1685–1692) in Roos, "The Art of Science"; Roos, *Martin Lister and his Remarkable Daughters*.

45 Gautier d'Agoty, *Observations sur la peinture et sur les tableaux anciens* (Paris, 1753). Eliz-

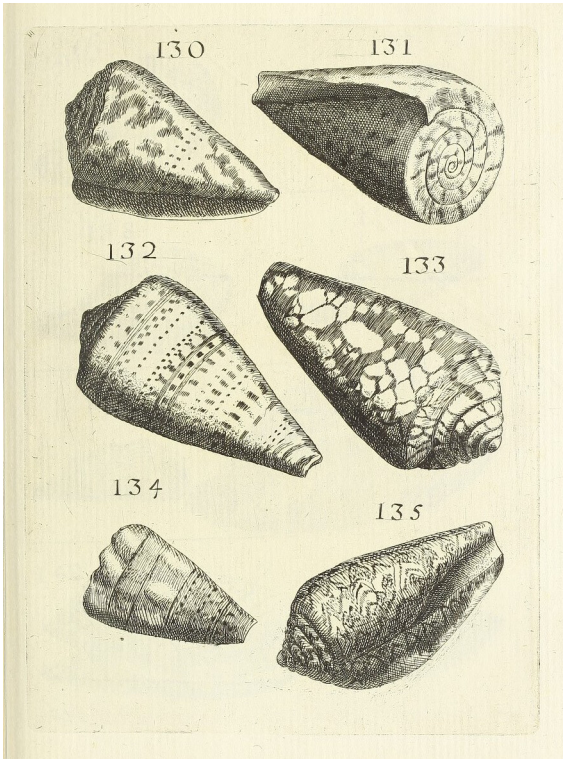

FIGURE 3
Filippo Buonanni, *Ricreatione dell'occhio e della mente* (Rome, 1681), with the *Drap d'or* illustrated as no. 135

trichromatic printmaking to the camera obscura; both enabled the creation of a painting "without a paintbrush," which is to say, as a mechanical *acheiropoieton*.[46]

The surface of the shell printed in the 1741 *Mercure* betrays no discernible linear pattern save for the foremost red ornament incised chemically with a mordant. What results is a remarkable congruency between the materiality of the subject and that of the print medium used to represent it.[47] Successive ink-

abeth Lavezzi, "Peinture et savoirs scientifiques: le cas des Observations sur la peinture (1753) de Jacques Gautier d'Agoty," *Dix-Huitieme Siècle* 31 (1999): 233–247.

46 Gautier d'Agoty, *Observations* … (1753), v, xiv, 79; Lavezzi, "Peinture et savoirs scientifiques," 246.

47 Mollusks grow accumulatively, from the margin up. This growth pattern results in three distinct shell layers: an outer proteinaceous periosteum (uncalcified), a prismatic layer (calcified) and an inner pearly layer of nacre (calcified). The three-layered structure affords an additional congruency between mezzotint and shell, as the number of copper plates Gautier used matches the number of strata. Francis Horne, "How are seashells created?," *Scientific American* 23 October 2006; Gert Lindner, *Seashells of the World*, trans.

ings of rocked burr and slight differences in plate registration lend the paper specimen the appearance of a convincingly heterogeneous granular body. Each pockmark in the copper substrate translates in the impression as a chalky grain or excreted salt constitutive of a mollusk's calcium-carbonate exoskeleton. Put another way, the pores of the mezzotint are polysemic: they index the rocker's mechanical process but also retain the layered, corpuscular composition of the shell itself, a texture that other intaglio techniques relegate to the status of "noise," emphasizing instead the reductive "information" of linear form.

3 Of Color, Polish, and Other Accidents

By the time Le Blon won his first privilege for trichromatic printmaking in 1737, the addition of color to illustrations had long been viewed with suspicion in European natural histories.[48] From Pliny the Elder (d. 79) to Monteux, philosophers and botanists consistently argued that using color did not result in any more faithful an imitation of nature than schematic line drawings or mere textual description. In the Aristotelian tradition, color was an accidental property; its explanatory force was neither causal nor demonstrative, and therefore no distinctions in essence could be made between species by virtue of appeal to observable hue alone.[49] Exterior appearances were considered separate from interior essences because, as was the case for plants, external features were often held in common by several species.[50]

No specimen of observational science had attracted so much attention in the debate over color's usefulness for natural history as had flora. Eighteenth-century texts on shell collecting suggest, by invocation of analogy, that the sources of shell tones were just as invisible, because unknown, as that of flowers. In *Conchyliologie*, Dezallier d'Argenville writes, "To discover the immediate cause of shells' beautiful colors is as difficult as finding out what colors flowers."[51] Gautier would later make his own comparison between the particle movement behind the color changes he observed in leaves and that which he

and ed. Gwynne Vevers (Poole: Blandford Press, 1977), 17–19; Jerry G. Walls, *Cone Shells: A synopsis of the living conidae* (Neptune City, N.J.: T.F.H. Publications, 1979), 11–12.

48 David Freedberg, "The Failure of Color," in *Sight and Insight: Essays on Art and Culture in Honour of E.H. Gombrich at 85*, ed. John Onians (London: Phaidon, 1994), 245–262; Kusukawa, *The Book of Nature*.

49 Aristotle, *Metaphysics*, 6.2.

50 Kusukawa, *The Book of Nature*, 102.

51 "Il est aussi difficile de découvrir la cause immédiate des belles couleurs des Coquilles, que de celles des fleurs." Dézallier d'Argenville, *L'histoire naturelle …*, 141.

believed lay behind the discoloration of petrified shells, as I discuss below.[52] In due course, he would also use the mezzotint color-separation process to depict flora in the *Observations*.[53]

But if Gautier were so intent on using *naturalia* to drum up interest in his tonal prints among *Mercure* readers—thereby making a case for color as an essential property of natural history illustration—why did he not opt for a botanical subject as a publicity piece in the first instance? Collectors no less than natural historians found shell color to be inconsistent and of secondary classificatory import. As Gersaint despaired, there were simply too many possibilities to enumerate in the limited space of a catalogue.[54]

Vivid color was nonetheless a valuable asset in the assessment of a shell's worth, which may have motivated Gautier's choice of subject.[55] The interest of *Curieux* in color was primarily tied to concerns as to the proper manner of cleaning and preparing shells. When mishandled, these procedures risked stripping a specimen of its pigmentation and, by extension, its market value.[56] First initiated to satisfy aesthetic preferences for luster and sheen, overzealous cleaning with nitric acid could have the adverse effect of destroying the very accidental features collectors sought to polish up for display. The risk was especially keen in the case of the *Drap d'or*, owing to the extremely light surface imprinting of its foremost pattern.[57] According to Gersaint, even the mildest polish could erase superficial pigmentation; one was better off reviving the natural luster with the hand alone.[58] The act of polishing introduces an interesting tension between the status of shell as *acheiropoieton* and the manual labor necessary for the shell's preparation.[59] As if to underscore the folly of man's meddling with God's ingenuity, Martin Frobène Ledermüller (1719–1769)

52 *Observations*, September 1754, Article XII, 128–129.

53 Ginseng is one example of this application to diachronic effect. Gautier shows the plant's stalk with color at two stages: "La Tige nouvelle que prépare la Racine" and "La Tige avec ses Feuilles & la Fleur." *Observations*, 1752, IV, 34–35, plate B.

54 "Enfin, sans entrer dans le détail des variétés de leurs couleurs, qui vont à l'infini, leurs formes seules ont entr'elles un très-grand nombre de différences, qu'il est presque impossible de décrire exactement." Gersaint, *Catalogue raisonné de coquilles …*, 8–9.

55 "La mérite d'une Coquille est d'avoir toutes ses points, ses bords, ou ses lévres saines, & ses couleurs vives." Ibid., 15.

56 Ibid., 16–17.

57 "… autrement on risqueroit trop, sur-tout à l'égard de certaines, comme les especes apellées *Argus & Draps d'or*, dont les couleurs, quoiqu'extrément vives, sont si légerement imprimées sur la surface, que le poli le plus doux seroit capable de les enlever." Ibid.

58 Ibid.

59 For the preparation and processing of shells as labor often invisible to early modern European collectors, see Claudia Swan, "The Nature of Exotic Shells," 21–47.

in *Troisième cinquantaine des amusemens microscopiques* relates a cautionary tale: an unfortunate experiment with aqua fortis resulted in substantial losses to his collection.[60]

Gautier's choice of the *Drap d'or* for his 1741 announcement is notable insofar as collectors and naturalists would both be in a position to understand that the pattern he fixes in ink was, in nature, unusually delicate and potentially fleeting. Furthermore, Gautier's choice to swap his incising tool from rocker to needle communicates, at the level of print technique, the difference between the relative solidity of the shell's body and the fragility of its surface color. Put another way, the how of the print's making directly bears on the fidelity of its content.

Gautier elevates the accidental property of the *Drap d'or*'s pigmented pattern to an ideal. The fact that colored designs were preserved on the specimens from the Mosson cabinet shows the care with which the entire collection was cleaned and handled. Was the value of these surfaces enough to confer worth to their paper surrogates? Given how many shells got destroyed or otherwise disfigured by over-enthusiastic eighteenth-century experiments with nitric acid, Gautier's mezzotint specimens surely found a market based on their ability to fix otherwise fragile patterns, which could, on paper, be safely varnished.

It bears noting, though, that the very caustic substance that obliterated shell patterns in collections like Ledermüller's (nitric acid or *l'eau seconde*, the dilution of the same with water) could, in its capacity as a mordant, just as easily generate them. Such was the case with the "textile" design Gautier etched in copper on the last of the *Drap d'or*'s plates. The multiple functions of nitric acid as a corrosive lend a certain irony to the cognate materiality of mezzotint and shell surface I have so far described.

Moreover, it was not only the resultant tone, but the texture, of impressions struck with variously inked plates that stood to please both *Curieux* and *Physiciens*. The heretofore unachievable textural fidelity of the *Drap d'or* stems from more than just the preparation of the matrix, which is to say, the all-over grain of the rocker, chemically incised lines, and the opacity of the color inks. Equally

60 "J'en avois déja choisi un 'petit Cabinet de Coquillage,' lorsque je m'avisai de laver ces Coquilles avec de l'Eau forte comme on lave les grandes … sur toute ma 'Collection.' Mais, par Bonheur, je n'y avois sacrifié que 20. à 30. de mes Beautés, lesquelles je mis dans une grande 'Coquille,' en versant dessus de l'Eau-forte, considerablement temperée avec de la douce, jusqu'à les y faire nager. Je voulus voir avec ma 'Loupe' L'Effet … mais j'en fus empêché par la Vapeur qu'exhaloit l'Eau-forte. Obligé d'y regarder par les simples yeux, je pûs connoître distinctement, qu'une de mes Coquilles choisies après l'autre se fendoit, crévoit, se détruisoit." Ledermüller, *Trosième cinquantaine des amusemens microscopiques*, 8–9.

contributive to the convincing granular effect of the mezzotint exoskeleton is the finish of the paper surface, which Gautier achieved either through registration of the final plate or with a coat of varnish applied thereafter. What finish collectors preferred for one commodity could transfer to the other: as Gersaint points out, "Whereas naturalists want raw shells, the collectors want them polished, in order to better perceive all of their beauty."[61]

How fortuitous, then, that a characteristic feature of color mezzotint is its dull, matte look, caused by the layering of successive plates.[62] While the intaglio design of Gautier's 1741 shell counters some of the flatness endemic to the process, there does result from the superimposition of like-rocked plates a certain rough, grainy effect, exactly that which Gersaint suggests naturalists wanted. The unvarnished plate appended to the *Mercure* thus succeeded in capturing the "raw" quality of the shells themselves, appealing to the *Physiciens*. A matte finish also communicated a lack of human intervention, the better to argue for the *Drap d'or*'s origin as miraculous *acheiropoieton*.

Not that Gautier ignored the desires of the *Curieux*. In the promotional 1741 inventory from the *Mercure*, he priced his wares to reflect both the cost of their printing and the finish applied to the sheets.[63] Preparations available included pasting the plate onto canvas; stretching the canvas; and, most importantly, varnishing it, as several of his extant anatomies demonstrate.[64] Whereas Gersaint suggested to his readers, "Isn't the point to see the beauty of the shell such as nature made it?," for Gautier and the advertising press, the point was more nearly to cater to as many customers—and their divergent desires for printed matter—as possible.[65] The printmaker's experimentation with different finishes also underscores the fact that for him, reproducing the surface of the shell, where color was deposited and polish applied, was of greater interest than the morphology of its volume or the linear contours of its sutures.

61 See "Observations …", the introductory essay of Gersaint, *Catalogue raisonné de coquilles …* (Paris, 1736).

62 Wax, *The Mezzotint*, 262.

63 "L'art d'imprimer les Tableaux avec trois Planches," *Mercure*, December 1741: 2924–2929. An example price was five *sols* for a mounted *moitié de 4.* [*toile*] sheet.

64 For the visual impact of varnished mezzotint, see Barbara Maria Stafford, *Body Criticism: Imaging the Unseen in Enlightenment Art and Medicine* (Cambridge: MIT Press, 1993), 76–78. For varnishing recipes in Le Blon's workshop see Stijnman, "Introduction," lxxxiv.

65 Gersaint, *Catalogue raisonné de coquilles …* (Paris, 1736).

4 From Burr to *les petites lames*

A decade later, Gautier specifically chose subjects for illustration in his new scientific journal because their classificatory or natural historical interest was tied to the accidental property of color.[66] In the September 1754 issue of the *Observations*, he included color renderings of two fish and a clump of moss viewed under the microscope (Fig. 4).

Of the fish, species native to the coast of Africa, he remarked, "They in particular required a plate, seeing as color is essential to the gathering of natural history."[67] A visual education in foreign fauna entailed comparisons with more familiar, local color: the first fish species was said to resemble one *aux Dorades*, the second, *aux Rougés de Provence*.[68]

As for the moss, Gautier sought to depict the many colors that a single species could assume after it had attached itself to the bark of different trees.[69] As he notes in the accompanying text, *le Journal Oeconomique* had recently run an article on the important subject of moss but had neglected to provide readers with sufficient visual information.[70] Motivated by the article, Gautier set out to distinguish the "accidental" colors of mature moss with help from his microscope. He reasoned that though all spores of the species began as a dull grey, they assumed different colors as a result of the particular tree to which they attached themselves and grew.[71]

---

66 Magdalena Bushart and Friedrich Steinle, eds., *Color histories: science, art, and technology in the 17th and 18th centuries* (Berlin/Boston: De Gruyter, 2015).

67 "Planche VII. Ci-jointe, représente deux Poissons des côtes d'Afrique, sort connus vers le Royaume de Juida. Celui de la Figure II. Resemble beaucoup aux Rougés de Provence; & la Figure I. aux Dorades. On m'a demandé cet essai en particulier, pour voir si la couleur est essentielle à cette partie de l'Histoire Naturelle. J'ai imprimé le même morceau avec des couleurs encore plus vives sous la presse de caractére." *Observations*, September 1754, 154.

68 Ibid.

69 "Planche IX. Elle représente une seule espéce de mousse vûe au microscope; c'est celle qui est de diverses couleurs, & qui paroît sur les écorces d'arbres comme des taches vertes, jaunes, blanches, & quelquefois noires. *Voyez page 130, art. XXI*." Ibid.

70 "Pour plus d'intelligence, je donne la figure & la couleur de ces plantes accidentelles dans la planche, à la fin de ce Volume, ce qui ne se trouve pas dans le Journal Oeconomique." Gautier was thinking primarily of naturalists as evident from his preface to the excerpted *Journal Oeconomique* article: "Cette matiére est assez bien traitée: la nature & l'origine des Mousses est un point d'Histoire naturelle sort intéressant, rien n'est méprisable sur la terre. Je vais faire un Extrit de ce que nous donne de bon ce Naturaliste." *Observations*, September 1754, 130.

71 "Par le secours du microscope, on distingue bien que ces taches ne sont que des amas de

FIGURE 4 Jacques Gautier [d'Agoty], *Moss*, in *Observations*, September 1754, Plate 9, color mezzotint, 1754
BIBLIOTHÈQUE NATIONALE DE FRANCE, PARIS

In both cases, one could read these glosses as savvy arguments for the necessity, or at least added value, of Gautier's trichromatic technique to the understanding of natural historical phenomena. To be sure, color had previously been added to scientific illustrations by hand; what changed with tri-chromatic mezzotint was that the creation of the image became indistinguishable from the addition of tonality.[72] Such an elision was especially apparent in the case of shells bodies—and nowhere more so than in Gautier's second pass at illustrating the *Drap d'or*. The shell makes a re-appearance in another illustration for the September 1754 issue of the *Observations* (Fig. 5).[73]

This later image evinces the same layered tones as the preliminary *Mercure* sheet. Joining the *Drap d'or* on the plate, though, is a *Coquille musicale*,

plantes réelles, Les mousses ont toutes pour racines des espéces de grisses, qui forment diverses ramifications, au moyen desquelles elles s'attachent & végétent." *Observations*, September 1754, 130.

72 For earlier color printing processes, see the essays in Ad Stijnman and Elizabeth Savage, eds., *Printing Color 1400–1700: History, techniques, functions, and receptions* (Leiden/Boston: Brill, 2015), with extensive bibliography.

73 Article XIX in *Observations*, September 1754, Plate 8, ill. on 126.

FIGURE 5 Jacques Gautier d'Agoty, *Drap d'or*, and *Coquille musicale*, 1754, in *Observations*, September 1754, Plate 8, ill. on 126, color mezzotint
BIBLIOTHÈQUE NATIONALE DE FRANCE, PARIS

eighth notes dancing on its eponymous exterior. Each is depicted twice, at opposite faces.[74]

Gautier elaborated on the making of this and other of the issue's color illustrations in an explanatory endnote.[75] He advises the reader that the shells belonged to the cabinet of Monsieur Davila, a collector in possession of "one of the most comprehensive collections in the genre [of conchology]."[76] He goes on to say that the shells published in the September section constitute only an initial essay of Davila's curiosities; he was to prepare the entire collection for color reproduction.[77] As with the 1741 advertisement, Gautier takes pains to specify that the *Drap d'or* represented is not just any shell—not, that is, an idealized composite—but a specific specimen, which he renders multiple through its editioning in mezzotint.

The illustration of Davila's shells accompanied a short article authored, as most in the *Observations* were, by Gautier.[78] The piece engaged with two disputes currently being hashed out via correspondence in the *Mercure*: the first on the composition of reindeer horn, the second, on the discoloration of fossilized and petrified shells.[79] At the center of the latter debate lay an epistolary exchange between one Monsieur F. Mussard [Musard] and Jean Jallabert (1712–1768), the Swiss mathematician and experimental philosopher then professor in Geneva.[80] Mussard had, in the course of studying his personal shell collection, observed the loss of pigmentation many mollusks experienced with petrification. In a letter to Jallabert on the subject, he reasoned that shells must deposit corpuscles of their former colors into the earth as they turned white.[81] He refused to believe that "such a prodigious quantity of color (more than several thick layers on various species of shells)" had simply "evaporated" or otherwise been "annihilated."[82]

Mussard anticipated objections to his theory, which arrived in the form of a response by Jallabert and, soon after, a public letter from a Monsieur Clozier,

74 For so-called "packing criteria" in arranging groups of shells on pages in early modern conchologies, see Spary, "Scientific Symmetries," 5.

75 *Observations*, September 1754, 154.

76 Ibid.

77 "Je ne donne ici que des essais; je me prépare a des collections suivies." Ibid.

78 "Lettre … concernant la décoloration des Coquilles fosilles," *Observations*, September 1754, 126–129.

79 *Mercure*, January 1754, 209–213; May 1754, 140–144; August 1754, 148–155.

80 "Lettre de M.F. Musard de Géneve à M. Jallabert," *Mercure*, May 1753, 86–93.

81 Ibid., 72.

82 "Pour moi, Je ne puis croire qu'une si prodigieuse quantité de couleurs (de plusieurs couches assez épaisses sur diverses espéces de coquilles) se soient évaporées ou anéanties." Ibid., 93.

an apothecary and correspondent of the Académie des Sciences from Étampes.[83] Clozier countered Mussard's claim by describing how, during petrifaction, stone juices (*les sucs lapidifique*) entered into the pores of the shell body and absorbed rays of light previously reflected by the pores, thereby turning the surface white.[84] Pushing back in a letter published in the *Mercure* a few months later, Mussard judged such an explanation "more ingenious than satisfactory."[85] One of the questions he posed to Clozier concerned the caustic action of *l'eau seconde* (diluted nitric acid). He wondered, "When *l'eau seconde* makes the colors of sea shells disappear and become white, is this the addition of matter or its removal?"[86]

It was at this point in the debate that Gautier weighed in from the pages of his new journal.[87] While siding with Clozier overall, he took the opportunity to advance his own hypothesis on the subject, claiming that shells lost color prior to undergoing petrification.[88] He cited as evidence specimens found in the sand that lacked color but were otherwise light and fragile—that is, not yet stone. To conjure the material difference, he likened such shells to plaster. This metaphor recalls the artisanal epistemology of Bernard Palissy (1510–1590) who, some two centuries prior, had used his knowledge of kiln chemistry to theorize the changes in state endemic to fossilization and petrification.[89] As

83 "Lettre à l'Auteur du Mercure," *Mercure*, January 1754, 209–213. For Clozier, see *Mémoires de mathématique et de physique, présentés à l'Académie royale des sciences, par divers sçavans & lûs dans ses assemblées*, vol. 2 (Paris, 1755), viii.

84 "En le suivant, la couleur est donc une modification de la lumiere, dont la variété est occasionnée par la différence tissure & les divers rangemens & ouvertures des pores du corps qui la réfléchir. La couleur ainsi définie, n'est certainement pas un corps, mais une simple apparence ou un accident du corps coloré, qui n'ajoute rien à son volume. Les coquilles fossiles ne perdent donc rien de leur substance en cessant d'avoir la propriété de réfléchir les différentes couleurs qui distinguent leurs analogues marins. La couleur blanche qu'elles retiennent, vient de ce que les sucs lapidifiques & autres parties très-deliées, en s'insinuant dans leurs pores, les retrécissent au point de ne pouvoir plus absorber aucun rayon de lumiere, & c'est précisément cette réflexion générale de tous les rayons de lumiere qui occasionne leur couleur blanche." Ibid., 213.

85 "Ce que vous avancez … sur la cause de la couleur blanche des coquilles fossiles, me paroît plus ingénieux que satisfaisant." "Lettre de M. Mussard à M. Clozier, à Estampes, sur la couleur blanche des coquilles fossiles, & sur les bois pétrifiés," *Mercure*, May 1754, 142.

86 "Lorsque de l'eau seconde fait disparoître les couleurs des coquilles de mer qui deviennent blanches après l'opération, est-ce addition de substance, ou est-ce enlévement?" Ibid.

87 "Lettre … concernant la décoloration des Coquilles fosilles," *Observations*, September 1754, 126–129.

88 "Je crois qu'une coquille perd sa couleur même avant sa pétrification." *Observations*, September 1754, 127.

89 Andrews, "The Space of Knowledge"; Shell, "Casting Life, Recasting Experience."

William Newman, Lorraine Daston, and Katherine Park have all noted, Palissy draws explicit analogies in his *Discours admirable* (1580) between the formation of fossils and the art of the potter, noting, for example, the presence of "exhalative waters" common to both processes.[90] The molds Palissy used for casting ceramics made available a further craft metaphor he adopted to explain how matter congealed during petrification.[91]

I detect a similar artisanal comparison, albeit a less explicit one, in Gautier's article, which suggests the persistence well into the eighteenth century of the sort of analogical reasoning from tacit workshop knowledge one encounters in Palissy's writing. Gautier goes on to describe the loss of a shell's color as occurring in the beginning stages of its decomposition, when tiny blades (*les petites lames*) on its surface, whose angles previously caused the reflection of colors, became flattened, collapsing in on one another.[92] Gautier here combines optical and material aspects of color in a manner akin to pre-Newtonian seventeenth-century corpuscular theorists, some of whom, like Isaac Beeckman (1588–1637), conceived of color in terms of surface texture.[93] But the image of collapsed or flattened blades also finds a direct analogue in the preparation of a mezzotint plate. Recall the burnishing and scraping process described above: any burr left standing holds colored ink, whereas the progressive flattening of the metal grain yields halftones and, in the event of total collapse, highlight—that is, white.

By suggesting the decomposition of superficial blades as a cause of discoloration, Gautier can accommodate another material paradox: petrified shells that nonetheless retain something of their color. By his reckoning, these specimens turned to stone before their minute blades began to collapse.[94] I would

90 For this connection see Lorraine J. Daston and Katharine Park, *Wonders and the Order of Nature* (New York: Zone Books, 1998), 286; William R. Newman, *Promethean Ambitions: Alchemy and the Quest to Perfect Nature* (Chicago: University of Chicago Press, 2004), 157.

91 Newman, *Promethean Ambitions*, 158.

92 "Ne penseriez-vous pas que c'est chez elles un commencement de décomposition, qui affaissant les petites lames, dont les angles occasionnent la réflexion des couleurs … puisque ces lames sont affaissées les unes sur les autres, & applaties." *Observations*, September 1754, 127.

93 Fokko Jan Dijksterhuis, "Understandings of Colors: Varieties of Theories in the Color Worlds of the Early Seventeenth Century," *Early Science and Medicine* 20 (2015): 523. As Dijksterhuis cautions, "There are no homogeneous doctrines and no clean breaks between schools of thought …. the 'alchemical' approach ran straight into eighteenth-century experimental philosophy." 533.

94 "Ces coquilles qui ont conservé quelque chose de leur couleur, quoique pétrifiées peuvent l'avoir été avant de souffrir cet affaissement ou commencement de décomposition." *Observations*, September 1754, 127.

argue that Gautier's appeal to *les petites lames* on both points offers clear evidence of a mind thinking comparatively between porous mezzotint plates and prickly shell exoskeletons. First-hand, tangible experience of the process behind the one—the rocked and modulated burr—provides a model with which to make sense of the other.

Gautier's hypothesis on shell pigmentation was conceivably as indebted to late seventeenth-century theories of salinity and corpuscularianism as it was to his direct experience with the color-mezzotint process and its variably accumulated spots of primary pigment held in burr.[95] Nitric acid (spirit of nitre) was central to the work of experimentalists at the early Royal Society, chief among them Robert Boyle (1627–1691), who used its "redintegration" and color changes to attack Aristotelian notions of perfect homogeneous mixtures.[96] Late seventeenth-century chemists working on both sides of the Channel also regarded nitre as a potentially "universal" formative salt, responsible for fossilization and minerallogenesis.[97]

Gautier himself, in the same 1754 article of the *Observations*, cites the saline chemistry of nitric acid shifting color to argue that a similar process obtains in two other instances of color change: those in leaves and in blood.[98] In describing the action of the acid, Gautier brings his experience in the print shop to bear once more, observing, "Nitric acid blackens and changes to blue, purple, or green, various colors … that's because it opens its pores and lets in certain particles that are equivalent; it is movement of transparent salts to surround it that brings about the change in color."[99] The acid solution employed in the etching

95 Anna Marie Roos, "The Saline Chymistry of Color in Seventeenth-Century English Natural History," *Early Science and Medicine* 20 (2015): 562–588; Roos, "Salient Theories in the fossil debate in the early Royal Society," in *Controversies Within the Scientific Revolution*, ed. Marcelo Dascal and Victor D. Boantza (Amsterdam: Philadelphia, 2011), 151–170; Roos, *The Salt of the Earth: natural philosophy, medicine, and chymistry in England, 1650–1750* (Leiden: Brill, 2007).

96 For a discussion of the connection between Boyle's arguments for heterogeneity on the basis of experiments with the decomposition and recomposition of saltpeter, and the possible influence his anti-Aristotelian notion of heterogeneity had on Newton's optical theory as to the mixed quality of white light, see William R. Newman, "Newton's Early Optical Theory and its Debt to Chymistry," in *Lumière et vision dans les sciences et dans les arts*, ed. Danielle Jacquart and Michel Hochmann (Geneva: Droz, 2010), 283–307, esp. 291–292 for nitric acid and blood.

97 Roos, "Salient Theories in the Fossil Debate,"159, 165.

98 For nitric acid, aerial salts, and plant tincture in the late seventeenth century, see Nehemiah Grew, *Anatomy of Plants* (1680), 276, cited in Roos, "Saline Chymistry," 585. Anna Marie Roos, "Nehemiah Grew (1641–1712) and the Saline Chymistry of Plants," *Ambix* 54 (2007), 51–68; Roos, *The Salt of the Earth*, 98.

99 "L'eau-forte noircit & ne change en bleu, en violet ou en vert, diverses couleurs & même le

of copper would generally be prepared by the continuous mixing of nitric acid and red copper, or cuprite, until the acid ceases bubbling and turns blue.[100] Gautier drew from his material knowledge of mordants, which he used to etch the foremost plate of the *Drap d'or*, in order to think comparatively about how salts acted to bring about color changes across saltish bodies.

The printmaker furthermore applies his understanding of the movement of salts in nitric acid to the phenomenon of discoloration Mussard observed in fossilized shells. Referencing the dispute in the *Mercure*, Gautier attributes the lack of visible pigmentation in such hardened specimens to compact sand particles (*particules sableuses & naturellement compactes*) clogging their pores. He explains that when a shell, after lying in the sand for some time, enters the fossilization stage, the oily, pigmented fluids that once surrounded the particles on its surface seeped out, absorbed into the earth. The core of the remaining shell would then appear white because dense sand particles and salts blocked its newly opened pores. By his reckoning, the movement of particles during fossilization led to the "total reflection" of light, or what he took for white.[101]

The granular fidelity of the accompanying mezzotint illustration helps the reader to better visualize the diminutive orifices Gautier describes in the text.[102] In addition, the printmaker-editor emphasizes the connection of image to article by citing the *Drap d'or* explicitly. He asks the reader to imagine what the species would look like with its pores blocked: "all white" instead of yellow or red, as in the print.[103] One cannot help but think back to the young Gautier,

---

blanc en jaune, que parce qu'elle ouvre des pores, & qu'elle laisse autour de certaines particules qui lui sont analogues, des sels transparens qui les entourent, & qui occasionnent le changement de couleur." *Observations*, September 1754, 129. I have translated "l'eau-forte" as aqua fortis, or nitric acid.

100 Willem van Leusden, *The Etchings of Hercules Seghers and the Problem of his Graphic Technique*, trans. St. John Nixon (Utrecht: A.W. Bruna & Zoon, 1961), 25–26; Ad Stijnman, *Engraving and Etching, 1400–2000: a history of the development of manual intaglio printing processes* (London: Archetype Publications, 2012), 45–57.

101 "Enfin ce n'est pas l'absorption de lumiére qui, dans mon idée, occasionne la couleur blanche, mais au contraire la réflexion totale, ainsi les porres bouchés devenant de solides, & tout solide opérant cette réflexion totale, ce corps décoloré devient blanc, parce qu'à l'extérieur il est tout solide." *Mercure*, September 1754, 127.

102 Compare Hanneke Grootenboer's interpretation of the "departure," or "take off," of tiny blobs of paint in seventeenth-century still life as generative of "a minimal, shallow space between the paint and its support, where meaning, or rather, a thought, has become suspended." Grootenboer, "The Pensive Image: On Thought in Jan van Huysum's Still Life Paintings," *Oxford Art Journal* 34, no. 1 (2011): 13–30.

103 *Mercure*, September 1754, 127. As illustrated, both the *Drap d'or* from Mosson's collection and that in Davila's presumably avoided such a fate by having been collected and prepared very soon after their erstwhile invertebrate inhabitants perished.

toiling in Le Blon's workshop, where, according to one account, it fell to him to isolate and prepare the whites for a multi-plate portrait.[104]

5 Conclusion: And What of the Newtonians?

Karin Leonhard writes that the road leading from inherited Aristotelian concepts of matter to the "the acceptance of Newtonian optics at the beginning of the eighteenth century" was a long one, requiring several "creative intermediate steps" and "a number of alternative proposals involving both scientists and artists."[105] Post-Newtonian theorizing, as evident in Gautier's writing, was by no means straightforward either, with the continued muddling of optical and material color concepts.[106] Newton's optics, widely embraced by French natural philosophers, diverged from the everyday experience of painters who regularly mixed colors in their workshops—however much Newton himself had experimented with melding dry pigments of two primary colors.[107] There was, of course, no "universal" color theory, just as there was no "universal" salt.

It remains an open question what influence Newton's theory of the mixture of light had on Le Blon's invention of trichromatic printing.[108] If this is indeed a fallacy, its perpetuation in present scholarship can be blamed in part on Gautier, who, in asserting the novelty of his own later four-plate process and its reliance on a black plate, contrasted his method with that of Le Blon, whom he characterized as having followed Newton's system.[109] A full account of Gautier's anti-Newtonian position and its formulation in opposition to Le Blon remains to be written. The conclusion to his 1754 essay in the *Observations* gives some indication of his combativeness on the subject. Gautier ends his remarks on shell discoloration with an open challenge to the "Newtonians":

---

104 Stijnman, "Introduction," lxxv; "Réponse de M. de Montdorge …," *Mercure*, July 1749, 177.

105 Karin Leonhard, *The Fertile Ground of Painting: Seventeenth-century still lifes & nature pieces*, trans. Russell Stockman (London: Harvey Miller, 2020), 169.

106 "La cause des couleurs selon Newton," "La cause des couleurs selon mon Système," *Observations* 1752, 99–106; Boskamp, *Primärfarben und Farbharmonie*, 195–196; Michael Baxandall, *Shadows and Enlightenment* (New Haven: Yale University Press, 1995), 91.

107 Isaac Newton, "Optica, Part II, Lecture 5," in *The Optical Papers of Isaac Newton*. vol. 1, *The Optical Lectures 1670–1672*, ed. Alan E. Shapiro (Cambridge: Cambridge University Press, 1984), 472–473; Sarah Lowengard. *The Creation of Color in Eighteenth-Century Europe*: *Figs., tables, exhibits* (New York: Columbia University Press, 2006), open access electronic book, http://www.gutenberg-e.org/lowengard/, accessed April 8, 2021.

108 Stijnman, "Introduction," lxxxvi–xc.

109 "Lettre à l'auteur du Mercure … sur l'invention d'imprimer les tableaux," *Mercure*, January 1756, 199.

how might they propose to explain the loss of pigmentation that accompanies fossilization?[110] One might extend this question to the matter of the accompanying trichromatic print itself. One thing is certain: by 1754, the *Drap d'or* has transformed from advertisement to "epistemic object," an object in whose corpuscular pigmentation, chemically incised outer layer, and rocked substructure various "color worlds"—the artisanal and the natural historical, the material and the optical—intersect.[111]

Yet as this article argues, Gautier's mezzotint shell and its instrumentalization in the pages of his scientific periodical make a case for the continued importance of embodied artisanal epistemology alongside Newtonian theory. What I have claimed regarding Gautier's technical-theoretical understanding of color change through the mechanics of a pocked matrix, as well as his stratigraphic approach to representing a mollusk exoskeleton, might best be compared with Mechthild Fend's interpretations of late seventeenth-century engravings of human skin, wherein intaglio printmaking techniques similarly inform an understanding of surface anatomy.[112] In the case of Govard Bidloo's *Vindiciae quarundam delineationum anatomicarum* (1697), the hatched texture of a copperplate's incised contours becomes coextensive with the weave of epidermal tissue (*weefsel*) that the printmaker seeks to make visible.[113] As Fend puts it, the engraved impression is a "visually interpreted and materially reenacted model of the texture, layering and functioning of the organ of touch."[114] The successive surfaces of Gautier's *Drap d'or* perform a similar metaphorization of matter with means of depiction.

In conclusion, it bears mentioning that Gautier's ingenious use of color mezzotinting to approximate the materiality of a shell's exterior anticipates the so-called chalk manner of later eighteenth-century French printmaking. Practitioners of the technique sought to copy the visual effects of chalk drawings. They adapted hand tools from metalworking (roulettes and *mattoirs*) to impress dots into their etching grounds. Like Gautier, they then filled these

110 "Les Newtoniens vont chercher pour expliquer ces phénomènes une infinité de raisons qui le contredisent: demandez leurr l'explication que je viens de faire selon leur sistème?" Ibid., 129.

111 For "epistemic objects" as meeting points for color worlds see Dijksterhuis, "Understandings of Colors," 534. Another way to interpret the epistemic import of the *Drap d'or* is as a border object, for which see Charlotte Guichard, "La coquillpalissye au xviiie siècle: un objet frontière," *Techniques & Culture* 59, no. 2 (2012): 150–163.

112 Mechthild Fend, *Fleshing Out Surfaces: Skin in French Art and Medicine, 1650–1850* (Manchester: Manchester University Press, 2016), 17–63.

113 Fend, *Fleshing Out Surfaces*, 49–53.

114 Fend, *Fleshing Out Surfaces*, 53.

pores with opaque inks—among which was a white lead that could be reinforced with calcium carbonate, the same compound found in draughtsmen's chalks and indeed, in mollusk exoskeletons.[115]

6 Acknowledgments

All translations are my own unless otherwise indicated. I am grateful to Ewa Lajer-Burcharth, Suzanne Smith, Andrew Griebeler, Jonathan Leal, Ashanti Shih, and Diane Oliva for their comments on early versions of this paper, and to the staff at the Houghton Library for their assistance.

115 Judith C. Walsh, "Ink and Inspiration: The Craft of Color Printing," in *Colorful Impressions*, 26–27.