BICOLOR MEMBRANA

ALL classical palaeographers are familiar with Persius' roster of writing materials:

> Now we take the book to hand, and the two-coloured parchment purged of hair, and papyrus, and a knotty reed.[1]

Of the items mentioned, only 'two-coloured parchment' presents any difficulty. I hope in this article to present at least a possible solution to this problem.

An obvious supposition would be that Persius is merely referring to the natural differences in colour between the two sides of a piece of parchment. It is a tempting explanation, since the hair side of a parchment leaf is yellower than the flesh side.[2] Thus we find, for example, Isaac Casaubon explaining *bicolor membrana* in terms of these natural colour differences.[3] The use of *bicolor* in the sense of having sides naturally of different colours is confirmed by Virgil.[4]

Unhappily, this resolution of the problem is in defiance of ancient testimony. St. Isidore of Seville (d. 636) writes:

> Parchment, however, is either white or yellow or purple. It is naturally white. Yellow parchment is two-coloured because one part is dyed (that is, made yellow) by the man who prepares it.[5]

The scholiast to Persius supports Isidore's explanation: 'bicolor, quod pars crocea, pars glutinata apud antiquos erat.'[6]

From Isidore's account we conclude that 'yellow parchment' and 'two-coloured parchment' are one and the same. It is also reasonable to suppose that by 'part' Isidore means 'side'. In short, for one reason or another, certain parchment was dyed yellow on one face.

If we ask why this dyeing would be done, an obvious answer is that it would produce an ornate parchment wrapper for a roll. Such parchment wrappers were often dyed.[7] We even hear of a yellow parchment wrapper.[8]

Hence some modern authorities simply dismiss Persius' *bicolor membrana* as a

[1] Persius, 3. 10 f. (ed. Ramsay): 'Iam liber et positis bicolor membrana capillis / inque manus chartae nodosaque venit harundo.'

[2] V. Gardthausen, *Griechische Palaeographie* (2 vols.; 2nd edn.; Leipzig, 1911–13), Vol. I (= *Das Buchwesen im Altertum und im byzantinischen Mittelalter*), p. 95: 'Die Haarseite des Pergaments bleibt immer etwas gelber und rauher. . . .' Cf. Hans Foerster, *Abriß der lateinischen Paläographie* (2nd edn. rev.; Stuttgart, 1963), p. 55: 'blieb die Haarseite, auf der die Poren zu sehen waren, dunkler und rauher gegenüber der glatteren und weißeren Fleischseite.' David Diringer, *The Hand-Produced Book* (New York, 1953), p. 192, incorrectly says that the flesh side is darker.

[3] *Auli Persi Flacci Satirarum liber*, ed. Isaac Casaubon (Paris, 1605), p. 235.

[4] *Aen.* 8. 276.

[5] *Origines* (ed. Lindsay), 6. 11. 4: 'Membrana autem aut candida aut lutea aut purpurea sunt. Candida naturaliter existunt. Luteum membranum bicolor est, quod a confectore una tinguitur parte.'

[6] *D. Junii Juvenalis & Auli Persii Flacci Satyrae cum veteris scholiastae & variorum commentariis* (editio nova; Amstelaedami, 1684), p. 52 (of the section on Persius).

[7] Cf. Ovid, *Tristia* 1. 1. 5; Martial, 3. 2. 10, 8. 72. 1, 10. 93. 4; Lucian, 'On Salaried Posts in Great Houses', 41; idem, 'The Ignorant Book-Collector', 7.

[8] Tibullus (ed. Postgate), 3. 1. 9.: 'lutea sed niveum involvat membrana libellum'.

wrapper of this sort.[1] This explanation is highly unsatisfactory, however, since Persius is listing the items needed by the scholar for his *work*.[2] An ornate wrapper is hardly necessary for such activity.[3]

It is far more reasonable to suppose that Persius intended the *bicolor membrana* to serve as 'scratch paper'. This view, moreover, is supported by Juvenal, who pictures the poet as using 'croceae membrana tabellae.'[4] Here the *tabellae* were pages in a parchment notebook.[5]

If Isidore was correct, then Juvenal's yellow parchment sheets were two-coloured, with one side dyed. Why, then, was mere scratch paper dyed yellow on one face? To find the answer we must consider the earliest Roman parchment.

All ancient evidence indicates that the Romans were first inspired to use parchment by a Pergamene delegation in Rome in the period 168/167 B.C.[6] Since Pergamene parchment provided the exemplar for Rome, our task is now to determine the nature of this Greek parchment.

Undoubtedly these Pergamene parchments were rolls. The use of leather rolls was widespread in the East;[7] presumably parchment, a material related to leather, would be employed in the same fashion. Equally compelling is the fact that a shortage of papyrus prompted the development of parchment[8]—to a degree, then, we must imagine that the parchment roll was to replace the papyrus roll.[9] Turning to more specific evidence, we find that Galen apparently refers to parchment rolls dating from the second century B.C.[10] and that parchment was used in roll-form in Priene in the first century B.C.[11]

[1] e.g. Sir Edward Maunde Thompson, *An Introduction to Greek and Latin Palaeography* (Oxford, 1912), p. 32.

[2] Cf. Persius, 3. 19: 'An tali studeam calamo?'

[3] The arguments against the assumption that Persius' *bicolor membrana* was a wrapper are brilliantly expounded in Theodor Birt, *Das antike Buchwesen* (Berlin, 1882), p. 60.

[4] Juvenal, 7. 23.

[5] Cf. *D. Iunii Iuuenalis Saturae xiv*, ed. J. D. Duff (Cambridge, 1940), p. 271; *D. Iuni Iuuenalis Saturarum libri v*, ed. Harry Langford Wilson (Boston, 1903), p. 67 (of the commentary): *D. Junii Juvenalis Saturarum libri v*, ed. Ludwig Friedlaender (Leipzig, 1895), p. 369.

[6] For a presentation and discussion of this evidence, see Richard R. Johnson, 'Ancient and Medieval Accounts of the "Invention" of Parchment', *California Studies in Classical Antiquity*, iii (1970), 115–22. Earlier the Romans had employed leather (rather than parchment) rolls to some extent—cf. Festus, *De verborum significatione*, s.v. 'clypeum', and Dionysius of Halicarnassus, 4. 58. 4.

[7] See my unpublished dissertation, 'The Role of Parchment in Greco-Roman Antiquity' (submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in History, The University of California at Los Angeles, 1968), pp. 3–21.

[8] Cf. Johnson, 'Ancient and Medieval Accounts of the "Invention" of Parchment', pp. 117 f.

[9] Plutarch, referring to the Pergamene library as it was in the first century B.C., speaks only of rolls (*βιβλία*)—*Vita Ant.* 58. Unfortunately, we do not know whether any of them were parchments.

[10] 18. 2. p. 630 (ed. Kühn): *τινὲς γὰρ καὶ πάνυ παλαιῶν βιβλίων ἀνευρεῖν ἐσπούδασαν πρὸ τριακοσίων ἐτῶν γεγραμμένα, τὰ μὲν ἔχοντες ἐν τοῖς βιβλίοις, τὰ δὲ ἐν τοῖς χάρταις, τὰ δὲ ἐν διαφόροις φιλύραις, ὥσπερ τὰ παρ' ἡμῖν ἐν Περγάμῳ.* The passage presents many difficulties (see G. A. Gerhard and O. Gradenwitz, 'Ein neuer juristischer Papyrus der Heidelberger Universitätsbibliothek', *Neue Heidelberger Jahrbücher*, xii [1903], 141–83, n. 38 on pp. 171 ff.), not least of which is "*διαφόροις φιλύραις*". I would suggest instead of this the reading "*τὰ δὲ ἐν διφθέραις, τὰ δὲ ἐν φιλύραις* (or, perhaps, *ἐν* [sc. *γραμματείοις ἐκ*] *φιλύρας*)"—cf. Johnson, 'The Role of Parchment in Greco-Roman Antiquity', pp. 55 f. When *διφθέρα* does not refer to a roll, Galen makes this clear (cf. xii, p. 423 "*ἐν πυκτίδι διφθέρᾳ*").

[11] Cf. *Inschriften von Priene*, ed. F. Frhr. von Gaertringen (Berlin, 1906), nos. 112, 113, and 114; Ulrich Wilcken, 'Zur Geschichte des Codex', *Hermes*, xliv (1909), pp. 150 f.

An important feature of the roll format is that writing on the external surface (the verso) is subject to abrasion.[1] Hence, where the beauty of the text was important, it was inadvisable to write on the verso of the roll.[2] When the text was for the author's own use, however, both sides of the papyrus roll were often used.[3]

An examination of the nature of ancient inks provides important clues as to whether or not the Pergamenes wrote on the verso of their parchment rolls. The standard ink of the day was, of course, India ink—some form of carbon (usually soot) mixed with gum.[4] The successful application of India ink to parchment presents difficulties, however. As Sir Humphry Davy noted, 'the ink composed of charcoal and solution of glue can scarcely be made to adhere to skin.'[5] Subsequent investigation has confirmed this verdict.[6] In the face of this observation it is disconcerting to find that some ancient parchments have texts—which are still legible—written with India ink.[7] Turning to the ancient Jews, whose customary writing substance was India ink,[8] we find that they superficially tanned the surface of parchments intended for religious usage.[9] One reason was certainly to adapt the parchment to their ink.[10] If the yellow surface of *bicolor membrana* was intended to perform the same function, then it appears that the early classical parchments were customarily inscribed only on the recto and that this was the surface dyed.

It is possible that the dye used was saffron. This is certainly suggested by Isidore's use of the term *crocatur*. Yet this expression often means only saffron-yellow in colour.[11] Some 100,000 to 200,000 flowers are needed to make a single pound of genuine saffron dye.[12] Quite possibly a substitute dye was employed for parchment 'scratch paper.'

One tantalizing bit of evidence indicates that the substitute may have contained tannin. In listing various types of ink, Dioscorides cites the following formula—soot, gum, 'ox-glue', and 'chalcanthos'.[13] The first three are ingredients for India ink; what, however, was 'chalcanthos'? The word was a generic term for vitriolic compounds,[14] and it is likely enough that the

[1] For papyrus rolls, see Jaroslav Černý, *Paper and Books in Ancient Egypt* (Edinburgh, 1952), p. 17; for leather rolls, cf. G. R. Driver, *Aramaic Documents of the Fifth Century B.C.* (rev. ed., 1957), p. 4.

[2] Thus Maimonides warns (Jewish) scribes against writing religious works on the wrong side (i.e., the verso) of a hide—cited by J. B. Poole and R. Read, 'The Preparation of Leather and Parchment by the Dead Sea Scrolls Community', *Technology and Culture*, iii, No. 1 (1962), 1–26, 18. Cf. Martial 8. 62. Such opisthographs were seldom, if ever, intended for sale—cf. Frederic G. Kenyon, *Books and Readers in Ancient Greece and Rome* (2nd edn.; Oxford, 1951), p. 63.

[3] Cf. Pliny the Younger, *Epp.* 3. 5 and Juvenal 1. 4–6.

[4] For the varieties recognized by the ancients, see especially Pliny, *N.H.* 35. 41–3 and Vitruvius 7. 10. 1–4. Dioscorides (5. 182) suggests a mixture of three parts soot to one part gum.

[5] Sir Humphry Davy, 'Some Observations and Experiments on the Papyri Found in the Ruins of Herculaneum', *Philosophical Transactions*, cxi (1821), 191–208, 205.

[6] Cf. J. R. Partington, *The Origins and Development of Applied Chemistry* (London, 1935), p. 207.

[7] An analysis of the ink on twelve parchments in the British Museum (third and fourth century A.D. in date) showed that three were carbon (i.e., India) inks—Alkin Lewis, 'The Lachish Letters and the Use of Iron Ink in Antiquity', *Nature*, cxxxix (1937), 470.

[8] William Nowack, 'Ink', *The Jewish Encyclopaedia*, vi (1906), 585 f.

[9] Poole and Reed, pp. 19 f.

[10] Ibid.

[11] Cf. Hugo Blümner, *Technologie und Terminologie der Gewerbe und Künste bei Griechen und Römern* (4 vols.; Hildesheim, 1969), i, p. 250, n. 3.

[12] Orth, 'Safran', *R.E.* Ser. 2, Vol. i (1920), cols. 1728–31, col. 1730.

[13] Dioscorides (ed. Sprengel), 5. 182.

[14] Nies, 'Atramentum sutorium', *R.E.* ii. 2 (1896), cols. 2135–6, col. 2135.

'chalcanthos' referred to by Dioscorides was a mixture of blue and green vitriol.[1] Now green vitriol (ferrous sulfate) is still used to dye leather black.[2] It will not, however, react with papyrus, India ink, or untanned parchment. If this particular ink were used on parchment with a tanned surface, the India ink would adhere very well (just as it does with Jewish religious parchments) and the green vitriol would react with the tannin to produce an additional 'ink'.

When the practice of using both sides of a parchment leaf became fashionable, it is probable that both sides were dyed yellow. By the second century A.D., however, a true iron-gall ink seems to have been known.[3] This type of ink can be applied to ordinary, untreated parchment.[4] There was now no necessity to dye either side of a parchment sheet yellow. As Isidore remarks, 'at first parchment was made yellow—that is, saffron—in colour; afterwards, to be sure, white parchment was devised at Rome.'[5]

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[1] Franz Maria Feldhaus, *Die Technik der Vorzeit der geschichtlichen Zeit und der Naturvölker* (2nd edn.; Munich, 1965), col. 1199.

[2] Cf. A. Emil Hiss and Albert E. Ebert, *The New Standard Formulary* (5th edn.; Chicago, 1920), p. 1075.

[3] The parchment leaf of Demosthenes' *De falsa legatione* (B.M. Add. MS. 34473 (1)), which probably dates from the second century, was written with an iron ink—Lewis, p. 470.

[4] Hence Davy believed that an iron-gall ink was introduced when parchment began to be used—Davy, p. 205.

[5] Isidore, *Origines* 6. 11. 2: 'Fiebant autem primum coloris lutei, id est crocei, postea vero Romae candida membrana reperta sunt . . .'. The techniques used in making white parchment of a better quality may well have rendered the use of India ink a bit more feasible by reducing the amount of grease in the parchment. In the Middle Ages, however, iron ink was very generally used on parchment. This was not simply a western custom, since Lucas found only iron inks on the medieval Egyptian parchments he tested. A. Lucas, 'The Inks of Ancient and Modern Egypt', *The Analyst*, xlvii (1922), 9–15, 11.