The Sir Daniel Cooper Lecture

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De La Rue and Colour c.1850-1910, Or An introduction to Chromatic Philately



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Why is your stamp that colour?

Why is it not lighter in shade or pinker?

This lecture suggests a structure for an analysis of the background to the colour, shade, tone or hue of any particular stamp, using De La Rue & Co's technology for a case study.

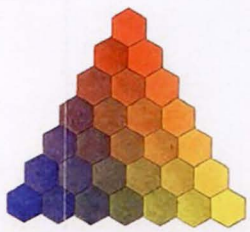
The lecture will be divided into eight sections for convenience, of which the first two can be covered quickly for they are 'external' or out of the printer's control. The rest, though, are within the purview of the firm and deserve far more time to be examined than is available today. Each could be the subject of a lecture in its own right. Only a representative glimpse will be given in each section of the numerous facets that could be included.

The sections are

1. Historical approaches to colour production.
2. Political, civic, national, or other forces external to the printers.
3. The primary sources of information.
4. The effects of the printing processes: The types of inks needed
5. The effects of 'makings' of colour: the inks and ingredients
6. The effects of the vehicles: linseed oils, varnishes, and additives
7. Effects of creating security: tinting, dusting, fugitiveness and fluorescence.
8. The firm's responses to such factors: standardisation, progress and development
9. Other ways of 'looking'- other questions that could be asked.

Part 1. Historical approaches to colour production.

It has been known since the 17th century that white light can be split into separate colours appearing as a rainbow. The colour 'pyramid' shows the effect of 'overlap' of the three primary colours, **yellow, blue and red,** to form the secondary colours **green, orange and violet.** In turn these can overlap to form the three tertiary colours: **citrine, olive and russet.** These are shown in



Lichtenburg's 'colour triangle' Today, computer printers are limited to the three colours known as **c**yan, **m**agenta, **y**ellow, (and **k**ey : black).

Waller's 'Catalogue of Simple and Mixt Colours'

The first known dissertation to show the combination of dies to produce printable pigments (illustrated on the back cover of this booklet) appeared in 1688 and is Richard Waller "A Catalogue of Simple and Mixt Colours with a Specimen of Each Colour Prefixt Its Properties," in *Philosophical Transactions of the Royal Society of London, vol. 6 for the years 1686 and 1687.*

Waller's notes describe how the horizontal bars above the squares such as Lutye, Vides, Rubei or Purpure dyes, can be mixed with the dry ingredients in the first vertical column containing such recognisable ingredients as cinnabar, carmine, rubrica and Dragon's Blood, brown ochre, or umbria. The resulting mixtures produce pigments in new colours suitable for printing such as ruby, silver, wooden, flaming, violet, purple, bloody, and iron colours (*rubei, ardentes, ignei, flammei, violacei, purpurei, sanguine et ferrei).* Many of the ingredients and combinations are not recognisable today, but those that are include carmine ('Coctinus, cochinides,') with cinnabaris to produce 'carnation'; while with 'Ostrinus' it produces Royal Purple; Cerrussa (lead carbonite, white lead ore) with Smalt (cobalt oxide) produces hyacinth (violet); Rubei mixt with Minium (red lead or lead tetroxide) produces a brick colour, etc. Waller also wrote:

> *'Indigo* said by *Pliny* to be brought from *India :* a kind of Mud adhering to the Froath about Reeds, and that when tryed with a Coal, the tru burns with a Purple-flame, and smells of the sea : Linschoten says it is called Anil, that it grows in Cambaiae, and is a plant like *Rosemary,* which is gathered and dryed, then wetted with fair Water, and beaten to a Mud; this Operation being repeated , it is dryed and fitted for use.'

Could this be the first recorded use of an aniline dye with its 'fishy' smell?

Part 2: Political decisions outside the control of the printers.

Such authorities as the UPU, Colonial administrations, Foreign Governments, Board of Inland Revenue, Government Departments, etc., could decide the colour of the stamp – but not the shade.

When new British stamps were required in 1880 to replace the recess-printed 'primitive' issues of Perkins Bacon & Co, in use for 40 years, De La Rue were instructed by the Board of Inland Revenue to use 'a red colour' for the 1d, 'but a lighter tint ... As recommended by the International Bureau.'[the U.PU.] As a result, the firm produced stamps in brownish-red inks for the ½d, 1d and 1½d stamps that closely resembled their predecessors to satisfy the Post Office and the public. These were based on copper red for the main ingredients, 'Agate red' being a vat-dye version of copper red.



The Board were not convinced by this 'Venetian Red'). De La Rue had long persuaded the Board about the security of their purple 'Fugitive' Inks in avoiding reuse of their stamps, and was by then only bettered by their new 'Doubly Fugitive'. The following year, the firm were therefore directed to use Doubly Fugitive Revenue Purple inks (the only colour available at the time) for the important 1d stamp because of its revenue function in collecting the tax on receipts rather than its postal one. This new stamp was issued in mid-1881 ignoring the U.P.U. directive, and in a letter of November 1881 the firm justified themselves with by claiming 'the [red] colour works with so much difficulty that it could not be adopted for stamps that had to be produced in such large quantities.'

In this case, it can be asked whether the stamp printers might be said to have manipulated their paymasters, the Board, to get their own way in using a more expensive (and profitable) ink?

[Definitions:

'Ordinary' Inks: any stamps receipted by using aqueous writing ink could be used again by being 'washed' with a solution of oxalic acid or other mixtures to remove the writing.

Singly Fugitive inks (SFI): any attempts to remove the writing ink would result in obvious damage from the removal of at least part of the stamp's surface.

Doubly Fugitive inks (DFI): any attempts at reusing the stamp by removing the writing ink, and any attempts to remove oleaginous postmarking ink, by using chemical cleaners like benzene, also resulted in an obviously damaged stamp's surface.]

Part 3: Primary Sources

The ***Correspondence Books*** – provides copies of letters and Appendix sheets.

The Recipe Books. The first two volumes of these are in The Postal Museum. The two duplicate volumes were cut up, four 'strips' to the page, and are now on the market together with both of the third volumes. These can be used to not only explain significant and deliberate changes in colour, but to understand why a colour might fade, say, or change colour due to chemical modifications if traumatised during storage.

[A model for tracing the genesis of particular inks from the *Recipe Books* can be shown by inks for the early 'British' 9d and 6d postage stamps.

The **9d postage stamp of 1862** was issued in what Stanley Gibbons Catalogues have called for more than a century a 'Bistre' and its later issue from 1865 in 'Straw'. De La Rue though, regarded both inks as 'Olive', and used its ink 613 as a mixer in other inks such as 647 Indian Telegraphs 20 Rupees, 681 for Hong Kong 96 cents revenue, 957 for Tobago 1/- Postage', etc.


Fugitive Inks.

Date 18 | lbs. | oz. | No. 613 Colour Olive

lbs.	oz.	
		9d English Postage.
2	8	Deep Chrome Silvine Ink. of No. 654.
4	4	Lemon " " " " 654. This Ink is
	14	Zinc Purple " " " now made as
	13	Crimson Lake " " " 661. Recipe of No. 910.
	3	Deep Dark Green. " 609



It's strip is endorsed *'This ink is now made as Recipe No.910'.*

910 F Olive 'Mauritius 25 Cents Postage' 'This is old 9d Postage'
10½ oz Cadmium Yellow Ink 836
¾ oz Cochineal Red Ink 612
½ oz Milori Blue Ink No.61 (sic)

But recipe 910, has a different formula for an 'olive' colour, mixing yellow, red and blue inks. As result there are two shades of the olive to be recognised.

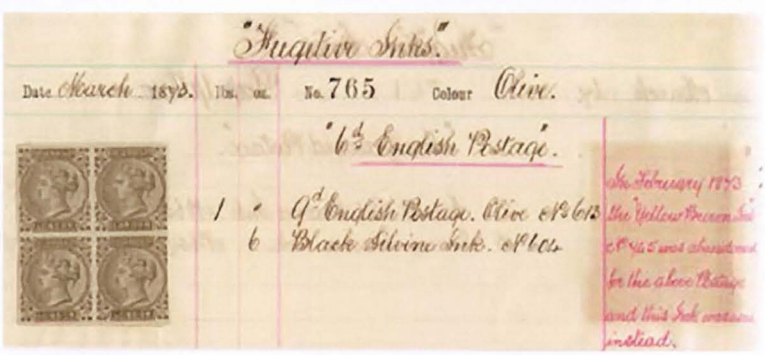
Similarly, **the British 6d** supposedly issued in 'Chestnut' or 'Buff' according to catalogues, was printed by the frim in two distinct inks as 'Yellow Brown' or 'Olive', based on the earlier Ink 613 just discussed.

745 F Yellow Brown 'English 6d.Postage'
1lb Yellow Brown (dry)
6½ Middle Silvine Varnish
5oz Long Silvine Varnish

(This Recipe crossed through) *'In January 1872 the Tyrian Purple No 610 was abandoned for the 6d Postage and this Ink was used instead.' 'In February 1873 this ink was abandoned for 6d English Postage and was superseded by the Olive Ink No.765.'*

765 F Olive Ink 'English 6d' Postage' 'March 1873'
1lb 9d English Postage Olive Ink 613
6oz Black Silvine Ink No. 604

'In February 1873 the 'Yellow Brown Ink' No.745 was abandoned for the above Postage and this Ink was used instead'


Fugitive Inks.

Date March 1873. | lbs. | oz. | No. 765 Colour Olive.

lbs.	oz.	
		6d English Postage.
1	0	9d English Postage. Olive of No. 613
	6	Black Silvine Ink. of No. 604

In February 1873 the Yellow Brown Ink of No. 745 was abandoned for the above Postage and this Ink was used instead.

[**Tyrian Purple.** The previous 6d postage issues had been printed in purple or lilac inks, the eponymous ingredient containing an aniline derivative and so can show fluorescence.

598 F Tyrian Purple 'English 6d Postage'
3lb dry Tyrian purple
1lb Long Silvine Varnish
1lb 8oz Middle Silvine varnish
'For the 6d. Postage this recipe was slightly altered. See Recipe No 610'

610 F Tyrian Purple. 'For 6d English Postage' (See 763)
4 lbs 8 oz Tyrian Purple (dry)
9 oz Long Silvine varnish
1 lb 8 oz Middle Silvine varnish
6 oz Thin Silvine varnish
'In January 1872 this colour was superseded by No.745.'

The addition of Thin varnish in recipe 610 allowed the inking cylinders to be used in faster machines whilst Silvine varnish ensured its (singly) fugitiveness.

This 'English contract' ink recipe was used for numerous other stamps such as Ink 648 'Indian Telegraph 8 Pies' and their 'Telegraphs 25 Rupees', 766 'Hong Kong 18 cents Revenue', or 689 'Cape 6d Postage'.

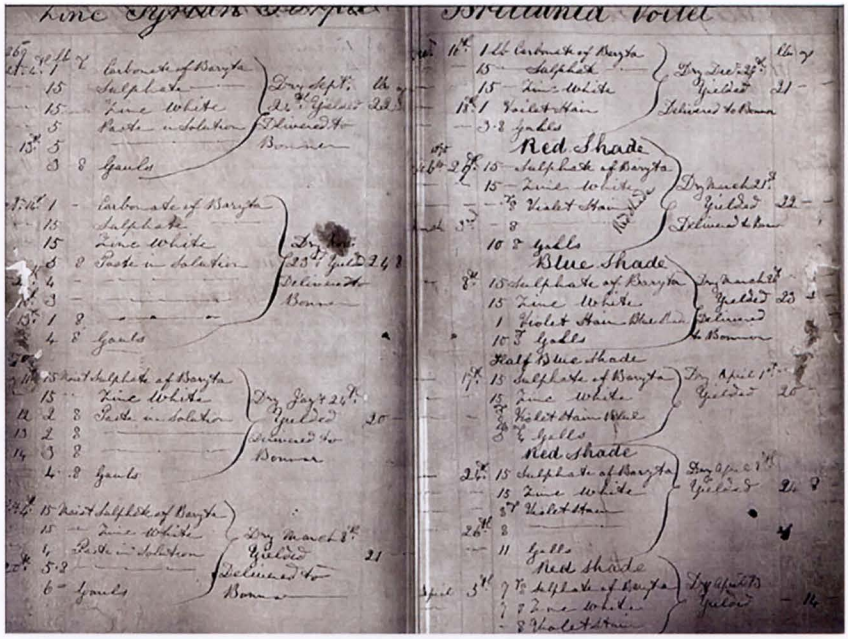
The Index (a volume now in the RPSL Museum.)

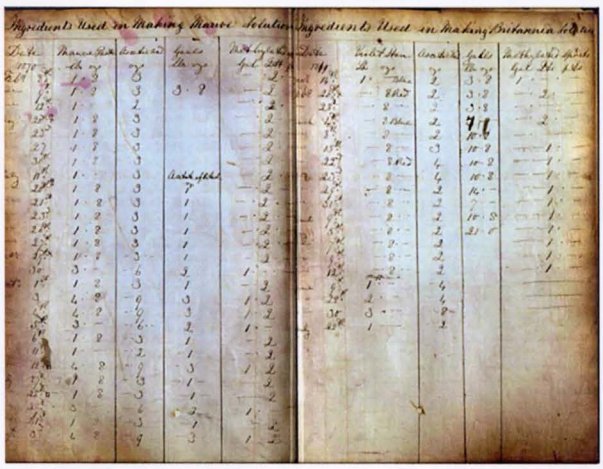
This index is a simplified reference for the printer to identify the ink recipe to be used for a particular stamp or bank note. The entries shows the denomination, the authority, and their recipe numbers. The earlier pages are written in a clear hand but the last half of the book is almost illegible and unreadable, although a transcript has now been attempted. One advantage of this *Index* is the listings of inks that were made or adapted from important, chemically 'sound' inks. So one page shows twenty-two inks made from Tyrian Purple Singly Fugitive Ink 610 in the *Recipe Book*. Today, then, the book is useful to quickly allocate particular stamps to particular inks.

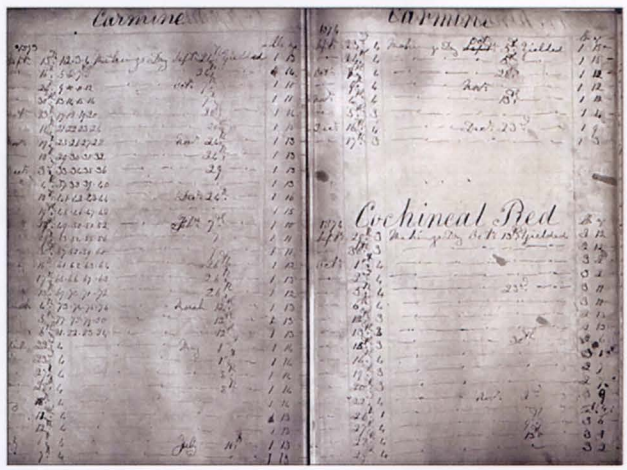
The Batch Records (a volume now in the RPSL Museum.)
This large volume of some 350 pages records the detailed composition of batches of inks on particular days, and the additives used by De La Rue in the makings of cochineal-based reds and purple inks in the late 1850s and 1860s. There were several different lay-outs used to do so.

The book also shows that there were several additives used that were not mentioned in the *Recipe Books*. Alongside the colourant Mauve Paste' appear Methylated spirits, lead acetate, stearic acid, zinc white, and oak 'galls' (for their tannins) The appearance of the finished stamps could be related to some of these batches when ingredients were extracted from biological sources, so the amount of dye a batch of insects or roots, say, could provide would be variable, making that batch of ink paler or brighter.

These records are as yet unstudied, so hopefully one day they will provide us with a far greater knowledge of their inks and their makings. Pages are shown in the frames. The book is on display in the Library. It forms the basis of several chapters in the recent book on inks published by the RPSL







Part 4: The 'makings' of colour: The inks and their ingredients

Some aspects of the physics of printing ink are so odd that a special set of rules had to be developed called **Rheology**, the flow of stiff liquids. It has, however, been ignored by philatelic writers, few of whom appear to appreciate the vital difference between a dye and a pigment.

Dyes & Pigments

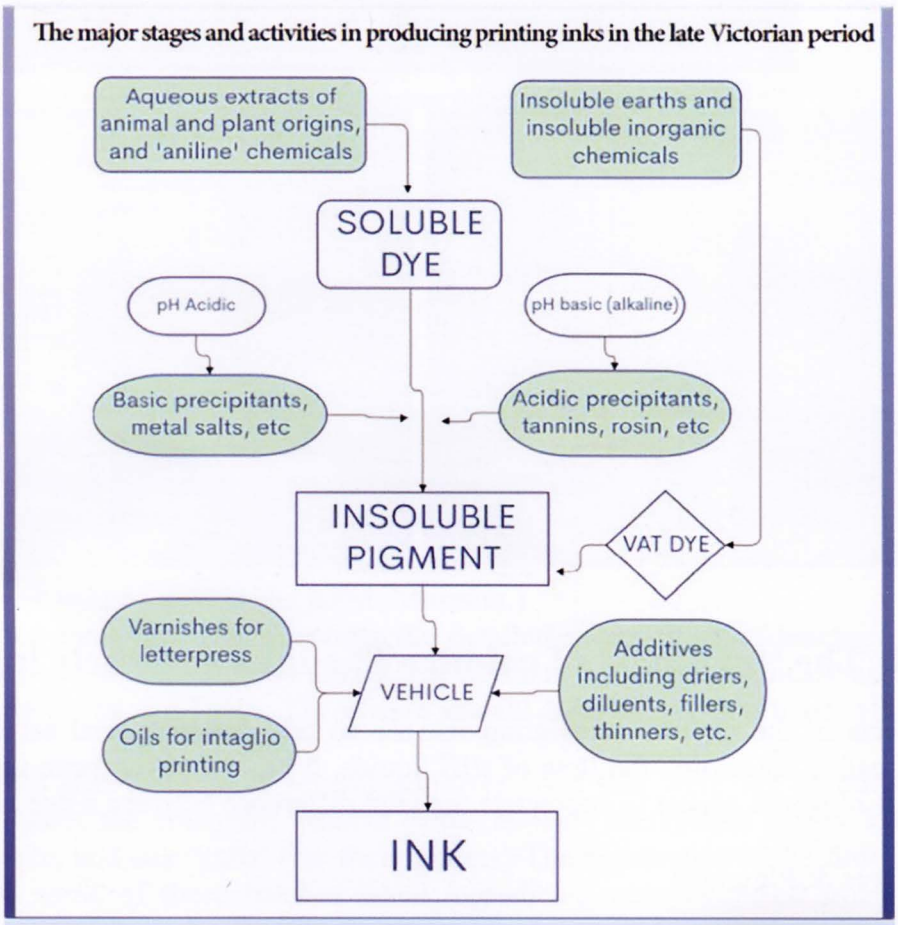
A **dye** (usually a **soluble** extract from a vegetable or animal source) simply penetrates the fibres being dyed, and so can easily be washed out unless 'fixed' in them by a mordant. This would be completely unsuitable for printing as the dye would flood across the paper. For printing on paper, the dye has to be chemically precipitated ('**striking**') with a '**base**' such as aluminium hydroxide or white lead, the same effect as a mordant, to enable it to become an **insoluble pigment**. When dried, this is ground fine and rolled in stiff varnish or linseed oil between three or more rollers for several hours. Endless sheering gradually coats every particle with this 'Long' varnish until a small quaintly of a thinner, runnier varnish is finally added to help the particles separate to obtain the ink.

The most obvious role of **pigments** is to colour the ink, but it can also affect the stamp's appearance by

- Providing gloss, abrasiveness and resistance to attack by light, heat, solvents, etc.
- The different sizes of pigment particles influence the intensity of a given colour.
- Some transparent pigment bases such as zinc oxide make the colours of other pigments appear less intense,
- Opacifiers are white pigments such as chalk or metal oxides that make the ink opaque so that the surface paper below the print cannot be seen.

All **Inks** required three elements

- the varnish made from linseed oil either 'pure', burnt or boiled,
- resins in the vegetable oil to improve the 'binding' of the ink ingredients and determine its 'hardness' and adhesion,
- pigment finely ground to allow the colour to spread evenly.



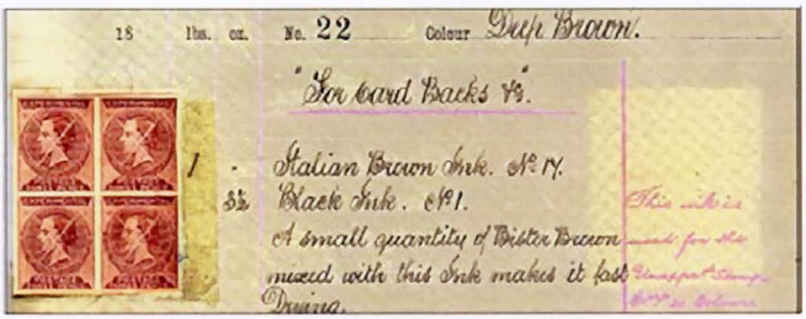
A forth set of ingredients were: **Additives**, used to alter the final properties of the ink.

- Surfactants improved spread over the rollers and the plate and wetting of the pigment or the paper.
- Lubricant waxes reduce abrasion, and provide 'rub' and scratch resistance.
- Alkali materials maintain the pH value
- Drying agents, salts or soaps of lead or manganese, catalyse the oxidation reaction to enable the print to bind to the printed surface and dry faster.

In practice, the number of additives was kept down to a realistic number.

Some of the firm's 'makings' showed Methylated spirits being an **additive** as a solvent to spread the ink on the 'composition' or inking rollers for printing, before drying by evaporating quickly in the air. Several stages in this process determine what you see as your stamp. Otherwise, trauma to the stamp from heat or damp could make the pigment break down liberating the dye to '**bleed**' through the paper.

'Driers' were the additives most used by De La Rue irrespective of the printing method. These included metallic salts such as manganese borate, Red Lead, or 'soaps' (saponates) of lead. Unusually, Recipe 22 was endorsed 'A small quantity of Bistre Brown mixed with this ink makes it fast drying' and which being a coloured earth could change the inks colour slightly.



A good example of this process can be shown from **Warren De La Rue's personal notebook** which he started recording in 1833 when he was he was only 18. One page dated September 1854 records the making for a purple ink for Foreign Bill stamps using cochineal. (It would be very close to making a carmine ink for the British 4d carmine postage stamps first printed by the firm in 1855.) It involved grinding Cochineal insects before boiling them in water for 20 minutes to extract the dye. After straining, the dye solution was returned to the vat to have the mordant alum added followed by a solution of the drier lead acetate. Meanwhile, zinc oxide, ground fine, was mixed in water in a sherry butt for the cochineal lake to be added and the red pigment 'struck', precipitated out.

Part 5: The types of inks needed.

The *Recipe Books* show that De La Rue had three basic types of ink that depended on the printing plate used.

Copper Plate inks for intaglio printing some stamps,
- but mostly for bonds, bank notes and such work,

Letterpress inks for most of their security production work,
- And lithographic or jobbing where 'fine' printing was required.

Ordinary inks for jobbing work; railway tickets, programmes, or sauce bottle labels.
- and playing cards, embossing postal stationery and fiscal stamps;

Copper plate (Intaglio, Recess-printing) needed a very thick, tar-like ink pressed into the grooves engraved on the plate.

No philatelic studies have been noted that discuss De La Rue's Intaglio printings, especially those using the commemorative key-plate system from late in the century. The synopsis below is only brief.

The firm developed more than two hundred 'Copper Plate' inks in their *Recipe Book* for their intaglio work, much of which was for bank notes and insignia on bonds, share certificates, and security work generally. Some were adapted from letterpress ink recipes.

De La Rue took over the printing of a number of recess-printing plates from Perkins Bacon & Co. but did not take their inks. Most of these plates were for Caribbean islands, Trinidad being the first in 1862; but its new stamps were being printed by letterpress by 1869. Similarly, Barbados and St Vincent plates were recess-printed by De La Rue in 1875 and 1882 respectively but they were soon using letterpress stamps. Developing and using their own equivalent inks should mean slight differences in the appearance between stamps from the two printers.

But then De La Rue also engraved their own intaglio plates always using linseed oil as the vehicle rather than one of the varnishes. Recipe 1582 for a bank note that used Thin weak oil for printing one side is, indeed, endorsed 'Hand and Machine' suggesting an intaglio hand press was indeed used, but that later a machine was able to use the same recipe.

1582 C Green 'Straits Settlement 50 Dollar Bank Note (front)
5oz Colour (dry)
3 ¼ oz Thin weak oil
'New Oxide of Chromium' ***'Hand & Machine'. '1st Job in this Class'***

1583 C - 'Straits Settlements Bank Note (back)
4oz New Oxide of Chromium Ink 1582
¾ oz Deep Seiden Green Ink 1963
'50 Dol Back on Machine'

De La Rue tried their best to persuade all clients to use their letterpress fugitive inks not only for their security fugitiveness but to establish a unique selling point not easily copied by competitors. They were usually successful. However, the American Columbus issue of the mid-1890s so impressed colonial authorities with its attractive intaglio pictures that they pressured the firm to be 'artistic'. Caribbean islands were particularly vociferous in wanting 'pretty' commemorative stamps that they could sell in bulk. De La Rue experimented with designs and inks until late in the 1890s they produced some key-plate **intaglio vignettes surrounded by frames printed by letterpress** despite the problem of intaglio plates 'needing' to be printed on damp paper but letterpress on dry paper. However, the ink of these early vignettes tended to run into the closely packed 'downs' on their recess plates or spread slightly on the damp paper, both of which simply resulted heavy blocks of dark colour as shown in the Jamaica stamp of circa 1900. Experience ensured that later examples of the intaglio vignettes had a clearer printing as seen in the St Lucia stamp of 1902.

New 'pretty' commemorative stamps appeared with vignettes engraved and printed by the firm for Zanzibar in 1896, Bermuda in 1898, Turks Islands in 1900, New Guinea 1901, St Lucia in 1902, Bahamas in 1903, British Guiana in 1903, as well as stamps for the Virgin Islands, Tonga, Uganda, and Western Australia, then there were the South African Union parliament 'commemoratives' in 1910.





The intaglio vehicle was often coloured or tinted from the burned or boiled linseed oil so the colours of the inks were usually dark. Most of the early key-plate stamps had the intaglio printing in blue-black or brown-black but other shades were used later with brighter singly fugitive letterpress frames (but see notes in Part 9)

The firm used cochineal for most shades of red printed by letterpress, but for those printed by intaglio they only used madder lakes. The recipe of May 1901 for the frame of this Jamaican 1d stamp, then, is unusual in including both as it does. It has been suggested that this recipe shows that De La Rue must have overcome the problem of cochineal bleeding and both the intaglio vignette and the letterpress frame could have been printed on damp paper.

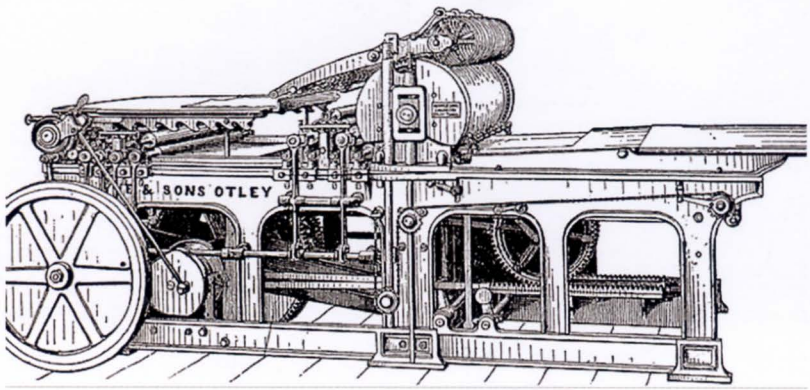
1610 C Red 'Jamaica 1d Postage'
Madder Lake O.O.
Madder Lake Burnt Scarlet
Cochineal Red
Vermilion
Orange Lead
Zinc White
'May 1901. ***Prepd as a 2 colr stamp. Duty forme Red, Centre, Blue Black.'***

240 O Driers Copper Plate 'For Copper Plate Inks & Others'
4oz Sugar of Lead [lead actetate]
4oz White Copperas [sulphate of zinc]
Put into an iron pot and boiled until you get rid of the water it contains then add
2oz dry Lithage [red lead oxide]
1lb Boiled Oil and grind fine.

Letterpress (Surface printing) needed a somewhat tacky 'long' varnish to adhere as a thin layer on the surface of the plate and not roll into the 'grooves'. Apart from the advantage that far less ink was required, the varnish dried more quickly, so the inks could be printed far faster, and being in a clear varnish, could use more pastel, pale or bright colours.

The Wharfedale style of printing press developed in the 1850s was never patented, so by the end of the century De La Rue's engineers had developed much larger and faster versions of the reciprocating motion that carried sheets of paper to be impressed by the plate inked by a number of 'composition' rollers. 'Double platen' machines (the two beds in the shape of a 'v') capable of

using as many as eight plates '240-set' at a time needed just smears of more dilute ink from the plate in faster operations. The designs of those stamps printed in enormous numbers had to be more 'open' with more white spaces and more 'solid' blocks of colour. Artistic designs were reserved for stamps printed in small quantities.



All these processes involved in the presses could slightly alter shades. **It is to their credit, then, how few such varieties appeared on the issued stamps of De La Rue.**

Lithographic Work:

The firm's lithographic plates used very stiff inks that were both hydrophobic and viscous and the utilised the difference between oleaginous areas of the plate and those attracted by water. As a result they were 'ordinary' inks and not used for security work. Philatelically speaking, the firm's designs for the process were always somewhat crude compared with their engraving work, and only used for cheap illustrative material. They were used to produce such illustrations for the Board as Jeffries Scheme of other shapes for postage stamps in 1883, or for those required for a trial at the Old Bailey.





Embossed printing

This process involved a male dye impressing a raised portion in the paper that was not printed, and leaving a surrounding flat area printed by letterpress using Ordinary inks. Few postage stamps other than those of the Gambia used the process. It was extensively used, however, by Somerset House to print duty paid stamps one at a time on fiscal documents in the ubiquitous vermilion ink that was not going to be cancelled by handwriting or oleaginous handstamps. Later, De la Rue were to adapt the process for their postal stationery in various colours.



This 1s 3d embossed stamp using a Wyon Head dye shows that bank note duty had been paid on the £5 note of the Oxford Old Bank of 1885.

Playing cards

Playing cards required a duty stamp, usually the Ace of Spades, and so were subject to security despite not being 'cancelled' by other inks. However, De La Rue's prepared numerous Ordinary non-fugitive inks for them that required specialised vehicles, fillers, and driers to print on the fronts and backs of the highly glazed and milled 'enamelled' thick card.

The Paper

The finish given to the paper by the final rollers could be critical: heavily rolled paper could produce a hard surface primed for pastel and lighter shades of colour for letterpress printing, while a 'soft' surface with looser fibres could be used for the darker colours of recess-printing. De La Rue even produced specialised inks for different surfaces such as Blue Ink 515 for 'On enamel paper'

One paper produced by Turners of Tunbridge Wells, Kent, for revenue stamps for the English and Indian contracts from the 1860s, and later for high denomination postage stamps until 1884, contained potassium ferricyanide as an optical whitener. On exposure to damp, this tended to reduce to the ferrocyanide, the blue dye, leaving large uneven patches of faint bluing showing in the paper. This could disturb the appearance of the stamps, most of which were printed in lilac.

The importance of the colour of the paper is stressed by those papers deliberately dyed in the vat, some of which could be strong colours. The earliest such papers involved Recipes 1040-2 for the yellow, red and blue papers of the English 'Jubilee' 2½d, 3d, and 6d postage stamps of 1887, all printed using DFI *Deep* Cochineal Purple. The red paper for the Gold Coast 20/- postage stamp needed *Extra Deep* Cochineal Purple ink 1184, and even the inks 1357-8 for the Transvaal 5/- and 10/- postage stamps dated 'Nov 1901' used deeper inks on yellow or red paper.

De La Rue even claimed in a letter to the Board that that a batch of paper had heavy watermarks showing through that affected the appearance of the colour.

Part 6: The Vehicles: Varnishes and Linseed oils.

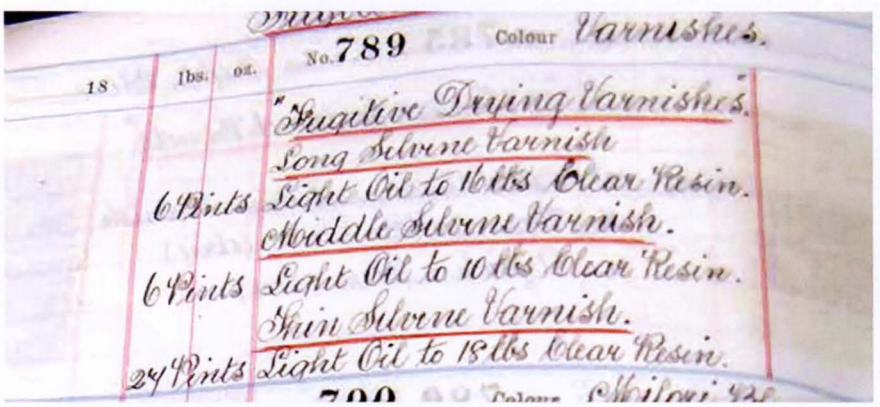
The colour of **printing inks** comes from insoluble pigments that sit on surface of the fibres of the paper, held in place by a chemical **resin** in a **varnish or oil**.

Vehicles **for recess printing** were Linseed oil, boiled or 'burned'.
Vehicles **for letterpress** were Linseed oil boiled with lead salts to form a clear printer's **varnish**.

All these vehicles contained

- **Resins** that bind the other ink ingredients together and bind the ink to the paper.
    - They also contribute to such properties as gloss and resistance to heat, chemicals abrasion and water.
    - They act as a drying agent
    - Many different resins have been used, but De La Rue almost totally depended on rosin.
- **Solvents** keep the ink liquid from when it is applied to the printing plate until after it has been transferred to the surface to be printed.
    - They allow it to rapidly separate from the body of the ink and evaporate to allow the image to dry and bind to the surface.

The 'Silvine' varnish was the firm's own version of clear resin diluted with light oil. Ink 789 records the making of the three types of their fugitive drying varnishes always used by the firm for singly fugitive letterpress stamps.



The 'Finger-tip test':

The more boiling, the thicker, tackier, stiffer the oil or varnish.
***a pinch can be 'drawn out' between separating fingers being known as* 'Long' varnish or 'strong' oil.**

Oil or varnish that has been boiled less will dry quicker but
a pinch will collapse quickly between the separated fingers and so will be known as 'short''Thin' or 'Medium'.



Part 7: Miscellaneous demands on appearance: tinting, dusting, fugitiveness and fluorescence.

Tinting.

De La Rue produced numerous inks to tint others in shades of yellow, red, blue and purple. Professor Hoffman's Britannia Violets, much used by De La Rue in the 1860s, contained ortho- or para- toluidine as **impurities** and the relevant proportions of these produced very different shades of red or blue mauve. A page in the ***Recipe Books*** shows four recipes using different amounts of soluble aniline dye being precipitated in White Lead Ink which provides the necessary base to prepare 'Britannia Violet Tints (Blue shade)'. They were also made as a stock item in William Perkin's factory at the time. (No ink number is given to the White lead ink in the recipe as the dye could be used on its own as an ink in this case.)

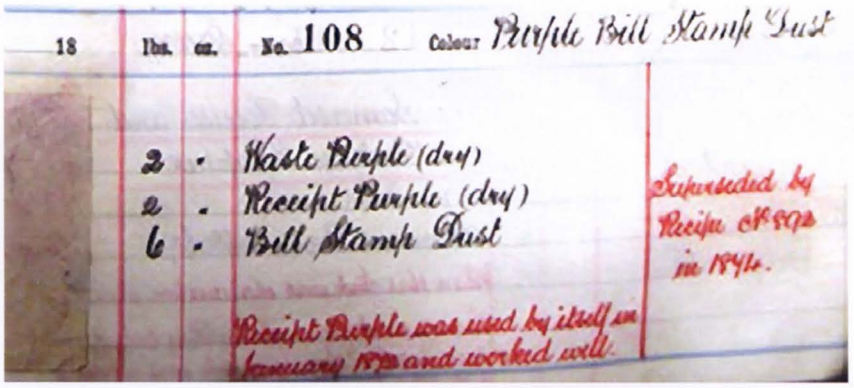
Today, the numerous stamps printed in Hoffman's Violet (or even Revenue purple) can therefore deteriorate if stressed to inadvertently appear pinkish or bluish. Other tints, such as those for orange or pink inks were also made using aniline dyes and show fluorescence (see below)

Dusting – the early forms of fugitive inks.

A receipt had to be written showing purchase tax had been paid when buying any goods or services, and this payment was shown by using a 1d stamp 'cancelled' by writing the date or name across it. The Revenue were concerned that this writing ink could be removed and the stamp reused. De La Rue developed their own security technology blowing a fine dust of pigment across the sheet of 1d revenue or postage stamp as they were printed, while the ink was still damp. Any attempt to remove writing from these stamps would then show as damage from the removed of this surface layer of pigment.

The different shades of Recipe Purple inks.

The *Correspondence Books* record that the various pence denominations of the Foreign Bill stamps were not dusted but all the shillings and pounds in the series giving more security to these higher denominations. Originally they used Ink 108 using freshly made Receipt Purple powder ground with dried remnants of previous batches of this Purple, and then with large proportions of special 'Bill Stamp Dust'. Using only Receipt Purple dust on its own without the other two ingredients was found to work just as well in 1872.

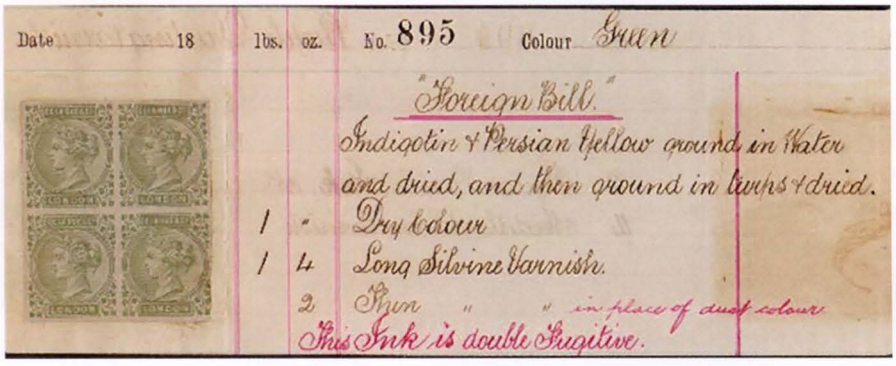


The recipes were superseded in 1876 by Purple Dust Ink 892 which had very different dry ingredients, namely Oriental blue, Cochineal Red and China Clay fine ground together before

being used for dusting the Revenue purple 1d and other receipt stamps for various Indian and colonial stamps of the 1870s and early 1880s. Recipes for some other dusting powders were recorded on the same page: Recipe 891 for Purple Dusting Varnish consisted of Tyrian Purple Ink 610 in extra Middle Silvine varnish, thoroughly dried and ground. although this like some other dusting varnishes made the colour deeper. As a result of dusting, revenue stamps can be found in a usual shade or colour, in a 'polished' finish due to the rollers on the thicker surfaces, or those dusted can appeared slightly deeper in colour.

Doubly Fugitive Inks.

Some three dozen Purple SFI and Purple DFI recipes were made by De La Rue over the years. They managed to perfect a recipe for **Green DFI** 895 in about 1883 and it was widely used throughout all their English, Indian and colonial revenue-collecting production thereafter. It is even inscribed 'in place of dust colour'. They tried to make a Red DFI ink but could not being able to do so satisfactorily, and may have tried to make a suitable blue DFI. Eventually they were able to produce a **Black DFI** by 1898 which they then used to print the Head Plate of numerous colonial key-plate stamps such as those for Trinidad, the Duty plate being printed in bright SFI colours. Just as the English Foreign Bill stamps can be found either undusted or dusted, they may presumably be found printed in a DFI purple or green from the same plates.





Part 8 – De La Rue's responses to such factors: standardisation and unification.

Experiments and trials for colour

De La Rue often had a vast knowledge of what suited which designs, which method of printing, plates or ink by the 1880s. Their two main directors had become Engraver to the Board of Inland Revenue and his Assistant. The firm started to dictate the colours and the shades. Choosing from colour trials was the prerogative of inexperienced and unskilled administrations. Often, the colours to be used had even been determined at or before the Artists Drawing stage. Moreover, ink making had been standardised to provide reasonable accuracy between one making and the next, and their coloured frames approved for one stamp could be adapted for another. As a result they first developed The Universal Colour Scheme in 1881, expanding their Key-plate system by 1887 and then combined both into their Universal Key-plate System from about 1888. Each of these determined which colour should be used for which denomination – unless other factors affected their choice. As they started to include new aniline ingredients becoming available in recipes towards the end of the century were colour trials sent for a short exposure to local conditions to test suitability and stability. However, while test runs might be satisfactory, production runs might show sight variations of hue.

The Universal Colour Scheme, 1881.

Obviously, standardisation would save costs making printing cheaper for smaller colonies. This scheme required all their postage stamps to be printed by letterpress in colours corresponding to those being used for the British contract, especially DFI purple for the 1d 'postage and revenue'. Stamps for local and foreign rates of postage such as the ½d & 2½d were printed in relatively large quantities and would use the U.P.U. red and blue colours respectively. However for stamps printed in small quantities, the idea was that the 3d would be in purple, 4d in brown, 6d in dark grey, 1s orange-brown and 5s in yellow-brown. This was not always adhered to.

De La Rue's Key-plate system, 1886-7.

De La Rue had devised a system that could print stamps using two 'throws' of a slow specialised hand-operated press in the 1870s. The drawback was that absolute alignment of the two printing plates and cleaning of the inking rollers became a necessity and required extra time. It was only of use, then, for small quantities of sheets. Developments, however, saw it speeded considerably, and it was widely used for large quantities of British stamps after 1887, and many higher denomination colonial stamps thereafter.

The two different inks for the Head Plate in DFI purple or green and the Duty Plate (usually in a bright SFI) had to be very quick drying to avoid off-sets, so they included a heavy use of driers such as lead acetate. Such opaque additives might result in a few cases of slightly paler shades of a colour. Furthermore, tinting for purple, blue, red colours with aniline dyes was tried, so later printings can show fluorescence.

De La Rue's Universal Key-plate system, c.1888.

Experience with their Key-plate system meant that the firm could make a Head plate at their own expense to be printed in DFI purple, green or black ink. Smaller colonies could then buy a Duty plate of 60 units for only £12 for each duty to be printed in suitable colourful SFI inks. Stamps could then be ordered in relatively small quantities such as one ream (500 sheets).

Other manufacturer such as Harrisons or Wilkinsons could develop similar systems of their own for security printing.

Part 9: Other questions that could be asked.

These include:

Is your stamp said to be printed in Black Ink really black? While Ordinary black inks were widely used for jobbing work and typography, Singly Fugitive Black inks were also used throughout the period for security printing stamps, bonds, bank notes and even for overprints. Later this included Doubly Fugitive Black. However, many if not most of these inks had Milori Blue (Prussian Blue) included in their recipe and can be identified by colorimeters as **printed in Blue Black ink**. Even the recess-printed vignettes in key-plate stamps from the turn of the century could be in blue-black rather than black. **It would seem, then, that catalogues should re-list a large number of colonial stamps.**

Why are your stamps not printed in yellow ink? The chromes – potassium chromate, chromium dioxide, cadmium salts and such – were used in several dozen inks for colours such as making green with a blue ink, or making vermilion or orange, tinting red with anilines, and for

their propensity to oxidise other chemicals into brighter colours and stop some being chemically reduced to a different shade.



However, the difficulty the eye has in seeing **detail** in shades of yellow meant the firm rarely used chromes on their own for printing. Despite this problem, of the four colour trials shown on this Appendix sheet for Indian revenue stamps in 1900, one has been chosen with the dismissive 'No.3. This colour will do'.

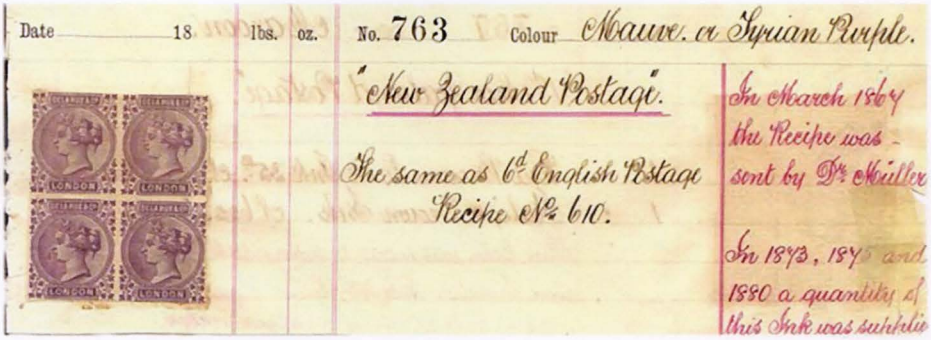
More often than not, yellow inks were mixed with other colours to obtain somewhat indeterminate blends. A recipe for Fawn ink, No. 2062, in Volume 3 of the *Recipe Books,* not only contained relatively large quantities of dry Deep and Lemon Chrome but counter-intuitively, some Milori Blue and some Azarin Red. Endorsements on this recipe showed that it was originally ink 1279, based on the Olive 'Old English 9d Ink 613' recipe previously described. On the same page was a recipe for another Fawn ink containing Cadmium Yellow ink mixed with Black ink, while an Orange ink required the yellow ingredient Phosphine ink mixed with Azarin Red and Cadmium Yellow.

Does your stamp show fluorescence? This 'glow' produced by **aniline ingredients** under UV light, often in a different colour, was only reported on some British stamps such as the first purple 6d from the 1860s, the 2s ultramarine from the 1870s, some head plates of the Jubilee Issue from the late 1890s, and the 1d lilac of about the same date. Recently, American and Canadian collectors have used modern scientific instruments to measure the signature of the ingredients of the fluorescence from some of their stamps. However, now that its cause is known, **it will probably be found on the frames of numerous De La Rue printings of colonial stamps from the period, 1880-1910** that used these aniline-derived inks.

What other stamps used that ink? Ever thrifty, if the firm found an ink was stable and printed 'good' stamps with one plate, they would use it on other plates. So were modifications made to an earlier recipe to prepare your stamp, or was the recipe modified to print later stamps?



Was your stamp printed by who you thought it was. Was it even printed in Britain? De La Rue sent bottles of ink to numerous authorities abroad such as Belgium, Ecuador, New Zealand and some Australian States. In some cases they sent printing plates with the ink after using them for some printings in London (an example was USA: Confederated States). They even sold a complete security printing factory to Italy having printed their stamps in London.



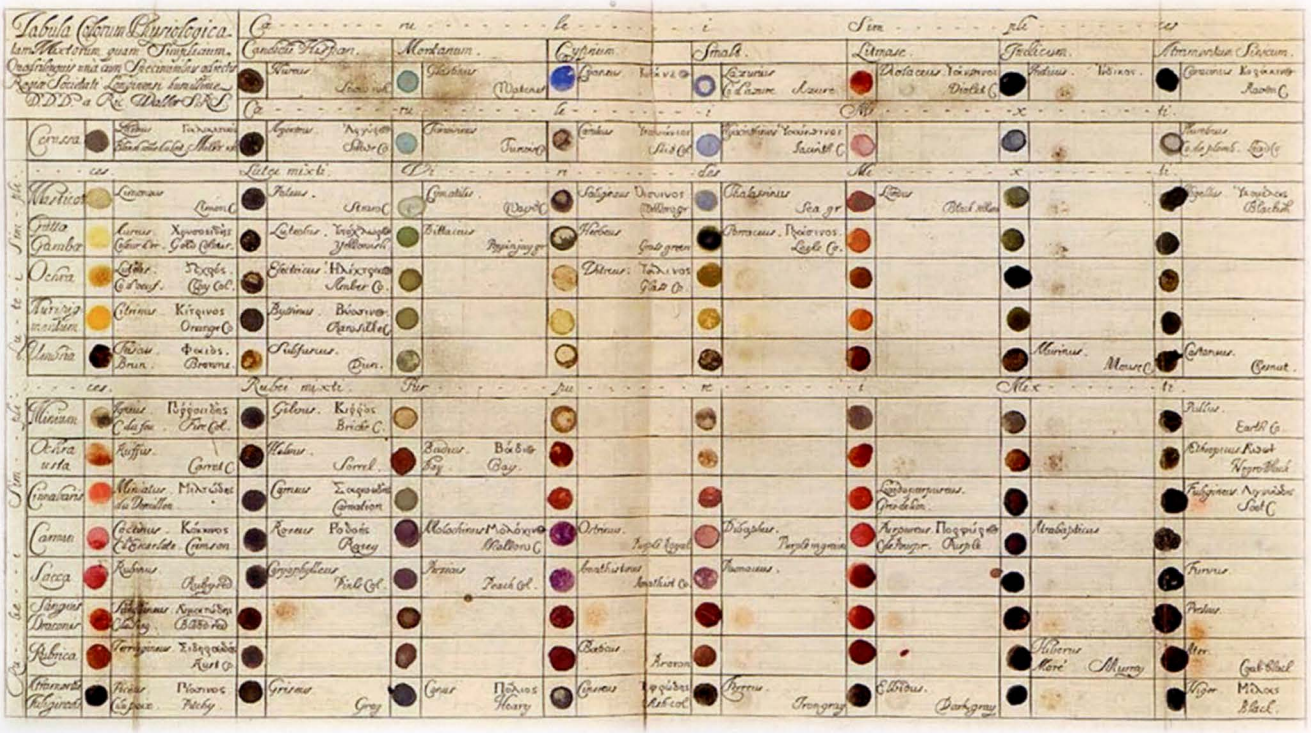
Was your colour derived from animal, vegetable or mineral sources, or was it created on the chemist's bench? This has significant ramifications. Following the first source leads to questions about how variable was the dye from the organic sources, how much and how many additives did the printer's eye find necessary, and did these create different surfaces, shades, and finishes. Following the other synthetic source, however, results in questions about the effect of the bases and the necessary additives to produce brighter colours and avoid the colour fading quickly. A change from organic (cochineal purple) to aniline derived colours for the English 1d lilac of 1881 can be easily recognised by the deeper, glossy purple finish on stamps from c.1898.

How did the printer check that the stamps were 'fit for purpose'? This raises the whole question of tests for the effects of damp, temperature and light, rubbing resistance, ink bleeding, etc., as well as the questions of essays in colour testing designs, and printing colour trials for appearance sake. Too wide a subject area to consider her.

'Chromatic Philately': In Conclusion

Colour has always been a controversial subject. This is mainly because everybody sees it a little differently. To complicate matters, most of us use it continuously, take it for granted and so think we understand it thoroughly.

However, it is to be hoped that having taken a sentence from here, an idea from there, with a paragraph in the Royal's recent book on the printing inks of De La Rue & Co, and examined disparate points and concepts touched on there, some may say that they can be pulled together into a new cohesive whole, approaching - even entering - the realms of a new 'scholarly' subject.


Tabula Colorum Physiologica
Candidi Hispan.
Montanum.
Cyprium.
Smalt.
Litmase.
Indicum.
Atramentum Sinicum.
Cerussa
Lutei mixti
Masticot
Gutta Gamba
Ochra
Auripigmentum
Umbra
Rubei mixti
Minium
Ochra usta
Cinnabaris
Carmin
Sacca
Sanguis Draconis
Rubrica
Atramentum Fuliginosum