

# Turkey red dyeing and printing

**Mohammad Shahid**

Centre of Textile Conservation and Technical Art History,  
University of Glasgow

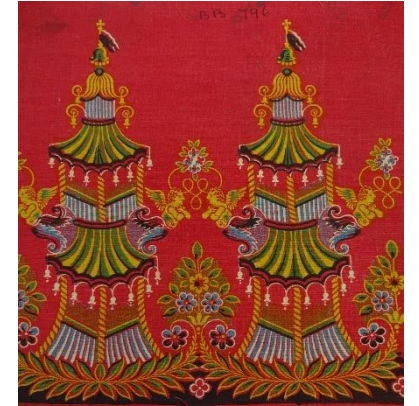


# Turkey red

- ❑ Dyed on cotton with oil, alum, dung, blood, tannins and anthraquinone dyes
- ❑ Much admired for its fiery colour, durability and fastness.
- ❑ Unusual and distinct process that was not fully understood
- ❑ Historical samples found in many collections



University of Glasgow Archive Services,  
Records of United Turkey Red Co Ltd,  
GB248 UGD 13/8/8.



Bradford College Textile Archive,  
Turkey Red Collection,  
BRFCM2005.1.162



West Dunbartonshire Council Collection,  
Glasgow



Day dress (1825-1830)  
T.74-1988 Image courtesy of the V&A

# Turkey Red Resources in the UK

Pattern books, Dyed and printed TR samples, export tickets, Printing blocks, Documents regarding the English Turkey red industry, Board of Trade Design Registers

## **Glasgow**

*Scottish Business Archives, University of Glasgow*

[www.gla.ac.uk/services/archives](http://www.gla.ac.uk/services/archives)

*Dumbarton Library, West Dunbartonshire Council*

[www.west-dunbarton.gov.uk](http://www.west-dunbarton.gov.uk)

*Glasgow Museums*

[www.glasgowlife.org.uk](http://www.glasgowlife.org.uk)

## **Edinburgh**

*National Museums Scotland*

[www.nms.ac.uk](http://www.nms.ac.uk)

## **London**

*The National Archives, Kew*

[www.nationalarchives.gov.uk](http://www.nationalarchives.gov.uk)

*Victoria and Albert Museum, London*

[www.vam.ac.uk](http://www.vam.ac.uk)

## **Bradford**

*Bradford College Textile Archive*

<http://textilearchive.bradfordcollege.ac.uk/>

## **Manchester**

*Greater Manchester County Record Office*

[www.manchester.gov.uk](http://www.manchester.gov.uk)

*Gallery of Costume, Platt Hall, Manchester*

[www.manchestergalleries.org](http://www.manchestergalleries.org)

*Museum of Science and Industry, Manchester*

[www.mosi.org.uk](http://www.mosi.org.uk)

# Light as TR

An EU funded project aimed at providing light exposure guidelines for sustainable collections display and access of 19<sup>th</sup> c. Turkey red. Identify materials and methods for 19<sup>th</sup> c. TR

## Terms used to describe Turkey red

- **Rouge de Turc (Turkey red)**
- **Rouge d'Adrianople (Adrianople red)**
- **Levant red**
- **Rouge de Smyrne (Smyrna Red )**
  - ✓ Levantine reference
  - ✓ Adrianopolis (Edirne, Turkey)
  - ✓ Smyrna (İzmir, Turkey)
- **Rouge des Indes (India red)**
  - ✓ 'in manner of Indies' or 'equal to colour of Indies'



F. Crace-calvert (1878)  
Dyeing and Calico Printing, 3<sup>rd</sup> Ed.

## Variations of Turkey red processes in literature

- Papillon's process
- Borelle's process
- French process
- Glasgowian process
- German process
- Elberfeld process
- M. Hausmann process
- Steiner process
- Process of Messrs. Montieth and Co.
- Emulsion process
- Turkey red oil process
- Old process
- New process
- Alizarin oil process

❑ Western Europe's first Turkey red dye works

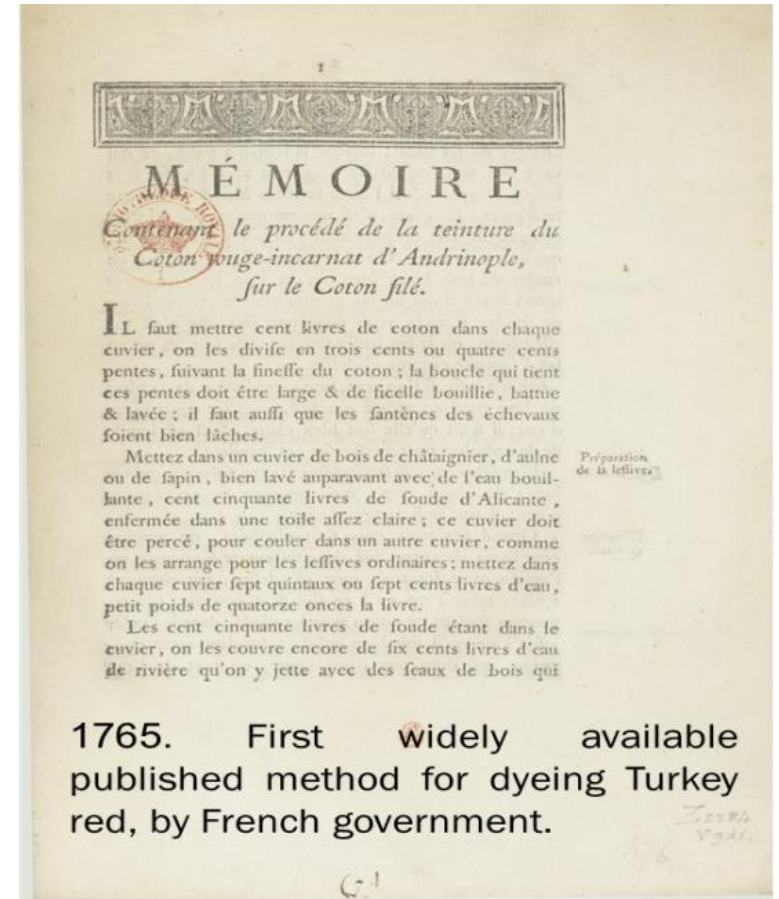
- ✓ Darnétal near Rouen
- ✓ Aubenas in Languedoc

Set up by Ferquet, Goudard and d'Haristoy around 1745 with the help of with the help of Greek dyers.

- ✓ Saint-Chaumont near Lyon (Charles Flachet)
- ✓ Nîmes (Simon Eymard)

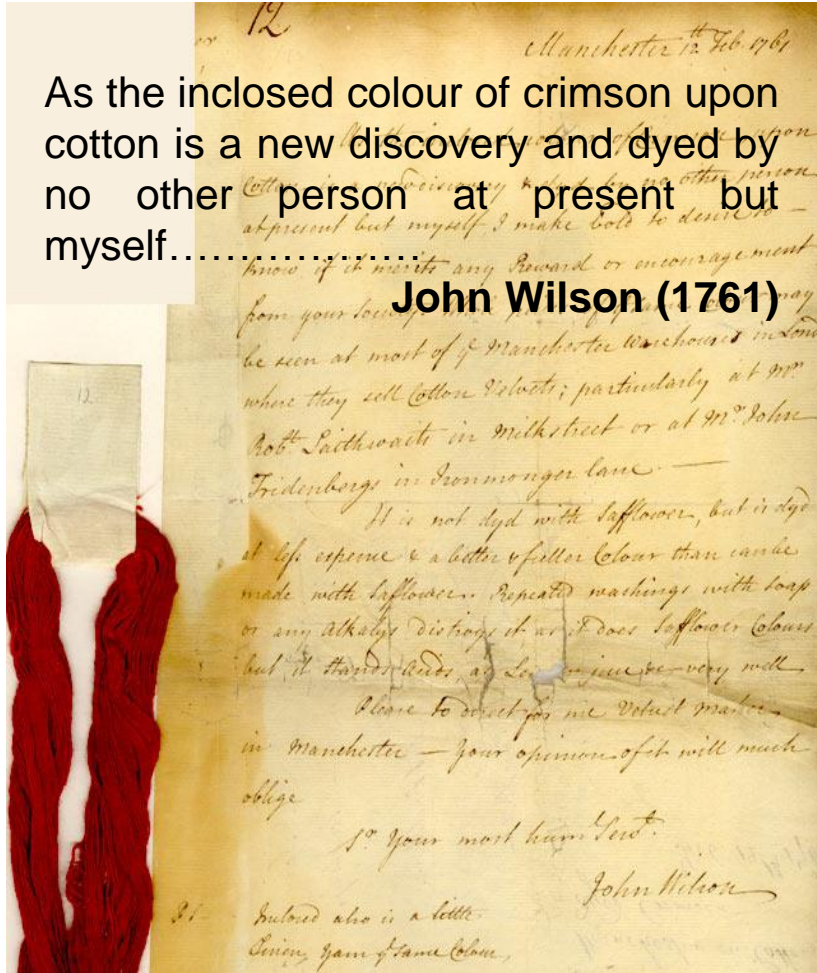
❑ In 1776, Pouce and Archalat, with French government assistance, hired a number of Greek dyers directly from Adrianople.

❑ Between 1780 and 1790 the dyers of Rouen dyed it so well, that they obtained almost a monopoly of the market.



Source gallica.bnf.fr / Bibliothèque nationale

<http://gallica.bnf.fr/ark:/12148/bpt6k6359837w>



As the inclosed colour of crimson upon cotton is a new discovery and dyed by no other person at present but myself.....

**John Wilson (1761)**

## John Wilson (Manchester)

- ❑ First man in Britain to dye TR.
- ❑ Procured the secret of dyeing TR from Greek dyers of Smyrna in 1750s.
- ❑ Society of Arts awarded him premium twice, **but reported that his dyeing lacked fastness compared with the imported article.**

*“The tediousness of so many operations, and the exactness required every time rendered it of no more value to me than the Madder red . . .” - WILSON, J.*

- ❑ After numerous failures, TR was eventually introduced in Manchester and Glasgow near the end of the 18<sup>th</sup> c.
- ❑ French dyers **Louis and Abraham Borelle** demonstrated their method to the Manchester Chamber of Commerce and received a prize of £2500.
- ❑ Another dyer from Rouen, **Pierre Jaques Papillon** submitted samples of his own Turkey-Red-dyed yarn to a member of the Manchester Chamber in February 1785.
- ❑ Borelle's method was published by Thomas Henry in *Memoirs of the Literary and Philosophical Society of Manchester* in 1790.



❑ In 1785, Papillon came to Glasgow at the invitation of businessman George Mackintosh.

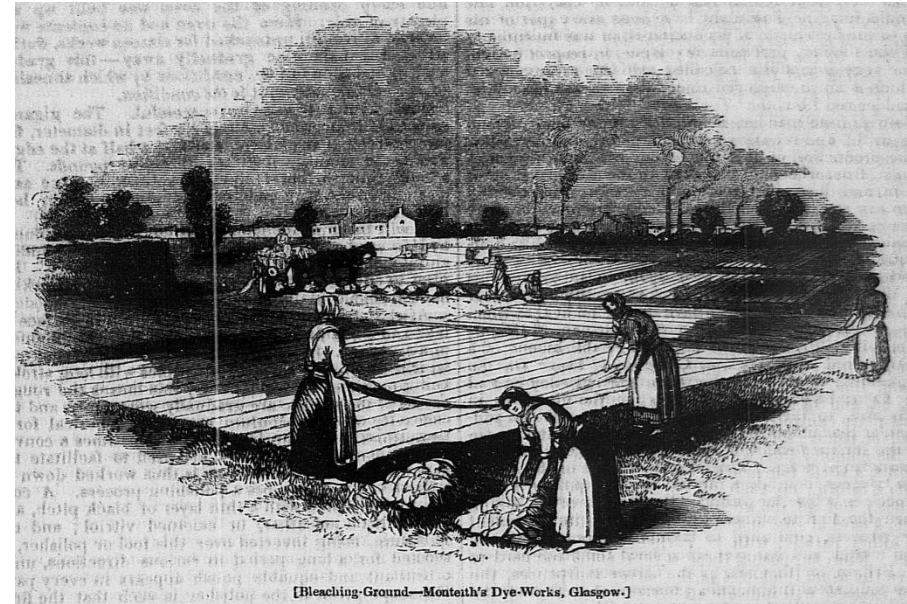
## ❑ Dalmarnock Turkey Red Works

- ✓ Established in 1785 by Mackintosh and David Dale
- ✓ Henry Monteith acquired the business in 1805 (renamed **Barrowfield Dyeworks**), specialising in dye for bright red Bandanna handkerchiefs.

*'I have made a great improvement in his process. I dye in twenty days what he took 25 to do, and the colour better' - Mackintosh (1787)*

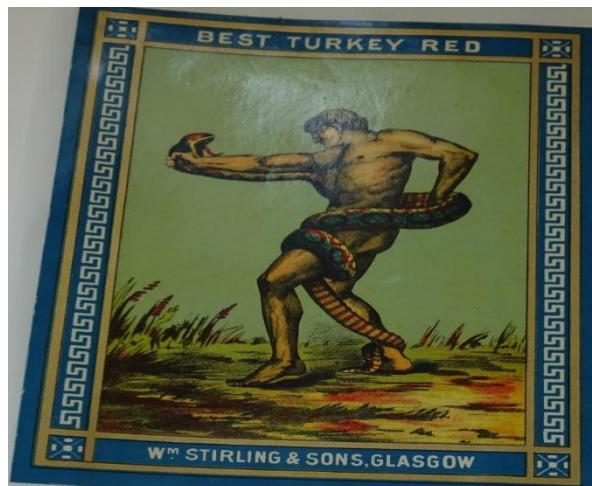
In the year 1785, Mr. George Mackintosh being in London, fell in with Monsieur Papillon, a Turkey red dyer from Rouen, carried him with him to Glasgow, and, in conjunction with Mr. David Dale, built an extensive dye-house at Dalmarnock in this parish, upon the banks of the river Clyde, where cotton is dyed a real Turkey red, equal in beauty and solidity to East India colours. There is another dyehouse,

The Statistical Accounts of Scotland, 1791-1794

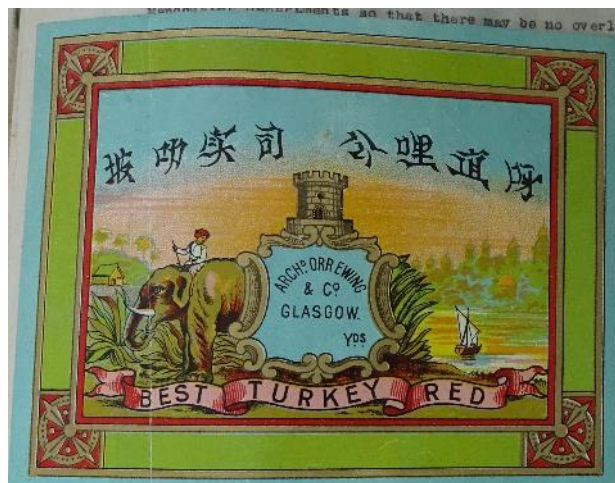


A DAY AT THE BARROWFIELD DYE-WORKS, GLASGOW. Penny magazine of the Society for the Diffusion of Useful Knowledge Jul 27, 1844

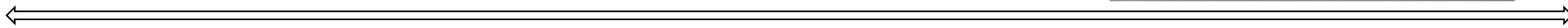
**William Stirling and Sons**  
Dalquhurn and Cordale works



**Archibald Orr Ewing and Co.**  
Levenbank, Milton and Dillichip works



**John Orr Ewing and Co.**  
Croftengea and Levenfield works  
(Alexandria works)




**Amalgamated to form United Turkey Red Co Ltd (1898)**



1982.16 Ticket Notebook  
West Dunbartonshire Council Collection, Glasgow

# Turkey red export markets

136454  
42360.



July 12  
Hali...

CLASS 24 (The Scarlet Cotton Piece Goods for export to India)

USED SINCE 22/9/1897

REREGISTERED FOR 14 YEARS FROM 26<sup>th</sup> OCT 1926

LODGED 26 OCT 1926 (CONFIRMED) 19 APR 1927


Block for Advertising in Journal sent London 2 FEB 1927

Advertised in Journal Vol 52 No 2551 page 287 16 Feb 1927

T.M. 10 to Manchester 27 Mar 1927

Registration confirmed on Form O No 2 dated 19<sup>th</sup> April 1927 (Handed to Dept's Dept of Filing 28/4/27)

B 136451  
42356.



(The Chinese Characters Right Left panels are the genuine equivalent of W.S.T.S Glasgow England)

CLASS 24 (Turkey Red Cotton Piece Goods for export to India)

USED SINCE 10/12/1897

REREGISTERED FOR 14 YEARS FROM 26 OCT 1926

LODGED 26 OCT 1926 (CONFIRMED) 16 APR 1927

Block for Advertising in Journal sent London 3 Mar 1927

Advertised in Journal 2555 16 MAR 1927 p 491

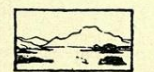
T.M. 10 to Manchester 22 APRIL 1927

Registration confirmed on Form O No 2 B. 16<sup>th</sup> May 1927 (Handed Dept 19/5/27)


TEXTILE MANUFACTURERS  
DYERS PRINTERS  
BLEACHERS  
MERCERISERS  
FINISHERS

CRETONNES  
Fastest colours obtainable.  
Hand block or Machine Printed

YARNS  
Bleached, Dyed and Mercerised.




TRADE MARK  
"LOMOND"  
HANDKERCHIEFS  
Red and White - Red, Black and White - Fancy Grounds, White and Printed Borders.



TRADE MARK  
"UTREE"  
FABRICS  
Guaranteed Fadeless.

Woven Shirtings. Woven Handkerchiefs  
Dyed Casement Cloth.  
Dyed Yarns for Manufacturers.



TRADE MARK  
"SUN AND LION"  
Turkey Red Chintz Prints.  
Turkey Red Twills.  
Black and Fancy Dyed Satins.

OVERSEAS AGENTS.

CANADA: A. W. Grasett, 407 Mackinnon Buildings, Toronto.

FRANCE: Rene Lewy Gavaron, 13 Rue Montholon, Paris.

NEW ZEALAND: J. W. Shackelford, Auckland.

ROUMANIA: Wm. Gluck & Fii, Bucarest.

EGYPT: Hettena Brothers, Hammam-el-Talat 15, Cairo.

HOLLAND: S. Kulker, Serphatestraat 87, Amsterdam.

U.S.A.: Gemmill Girvan & Co., 47 Worth Street, New York.

BELGIUM: Robert Laleman, Chaussee de Wemmel 93, Jette-Bruxelles.

CENTRAL & S. AMERICA: Agencia Cowie, Calle Moreno 750, Buenos Aires. Agencia Cowie, Rua Alvares Penteado 27, Sano Paulo, Brazil.

SOUTH AFRICA: Davies, Gnodde and Smyth, 1 Strand Street, Port Elisabeth

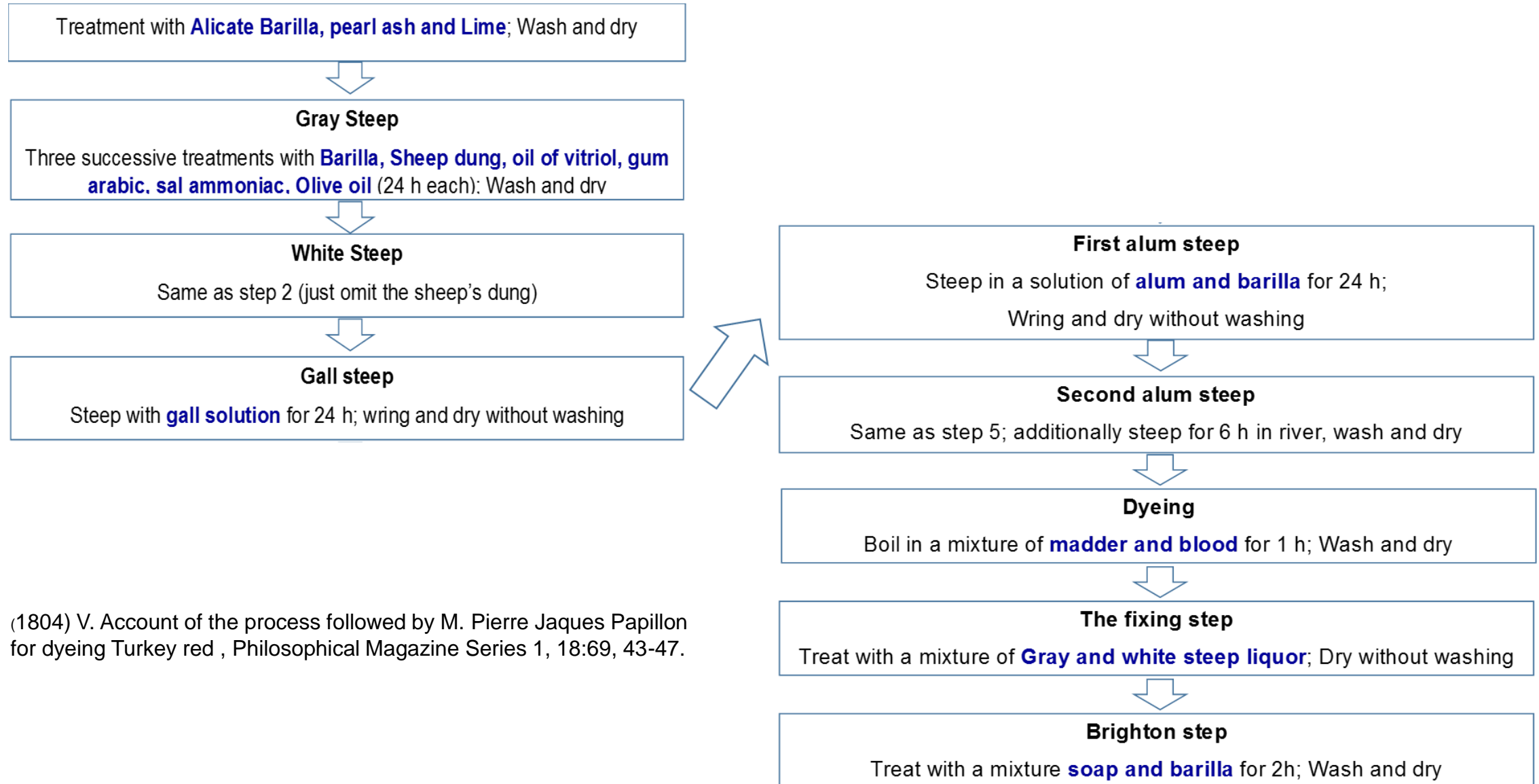
THE UNITED TURKEY RED COMPANY LIMITED

46, WEST GEORGE ST., GLASGOW, SCOTLAND.

Telegraphic Address "Lomond, Scotland."

[https://www.gracesguide.co.uk/File:United\\_Turkey\\_Red\\_Co\\_1920RD.jpg](https://www.gracesguide.co.uk/File:United_Turkey_Red_Co_1920RD.jpg)

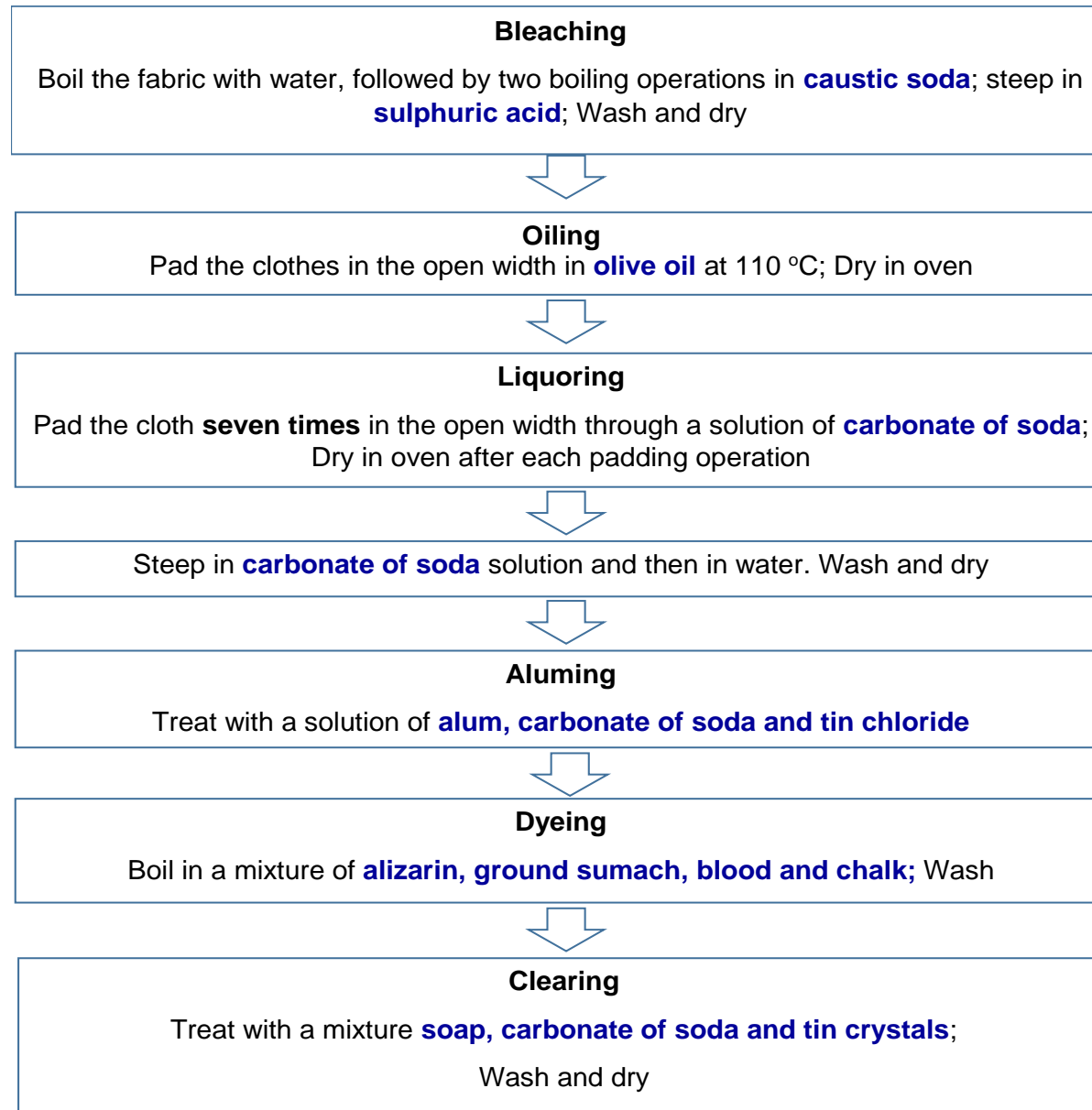
# Papillon's Process for Dyeing of Turkey-red yarn



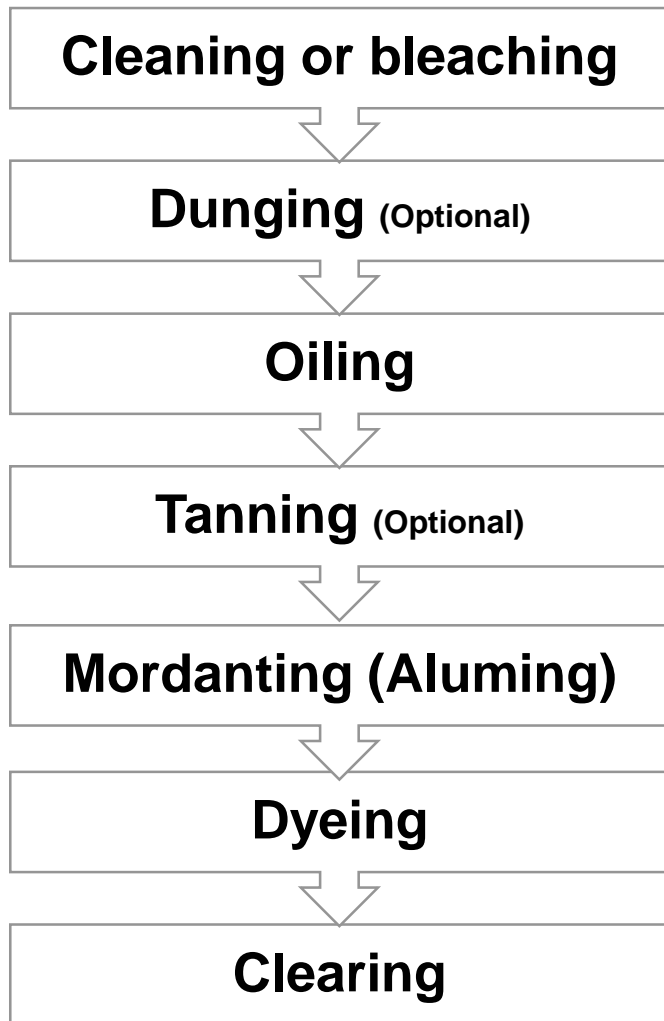
(1804) V. Account of the process followed by M. Pierre Jaques Papillon for dyeing Turkey red , Philosophical Magazine Series 1, 18:69, 43-47.

# Steiner's Process for Dyeing of Turkey-red Cloth

J. J. Hummel, 1886, The dyeing of Textile fabrics – 3<sup>rd</sup> Ed.



## A simplified flowchart of TR process



Cost of dyeing 112 lbs of the process first 6 months of 1873

Quantity	Unit	Item	Price	Total
4 3/4	lb	Madder roots	22	104 1/2
2 1/2	lb	Madder roots	44	111
2 1/2	lb	French bark	44	111
33	lb	Garancine	175	5775
7 1/2	lb	Alizarin	31	232 1/2
33 1/2	lb	Olive oil	26.9	891 1/2
18 1/2	lb	Pearl ash	38	695 1/2
2 1/2	lb	Sumac	11	27 1/2
1 1/2	lb	Sumac	18	27 1/2
1/6	lb	Alum	9 1/2	1 1/2
16 1/2	lb	Soda	7 1/2	121 1/2
3 1/2	lb	Crystals of tin	12	42 1/2
1	gallon	Blood	28	28
5 1/2	lb	Caustic soda	20	110
1 1/2	gallon	Red liquor	8	12
1 1/2	lb	Phosphate of soda	5	7 1/2
1	lb	Bleaching powder	12	12
17	lb	Sheep dung	5 1/2	93 1/2
7	lb	Cow dung	9	63
25	lb	Retard	4 1/6	103 1/6
4	lb	Corn man acid	4	16
24 2/3	lb	Peas	19 1/2	478 1/2
		Wages	13	13
		Ten times	70	70
		or 1/4 lb of ...	7 1/2	7 1/2

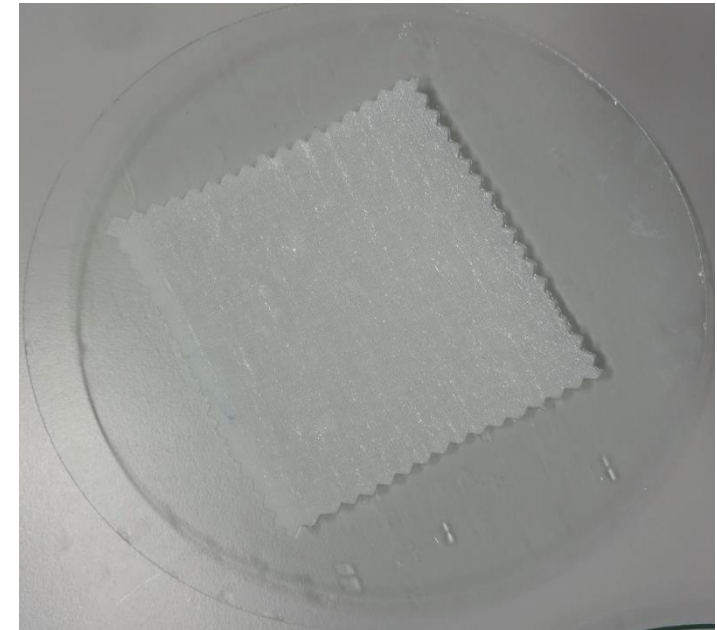
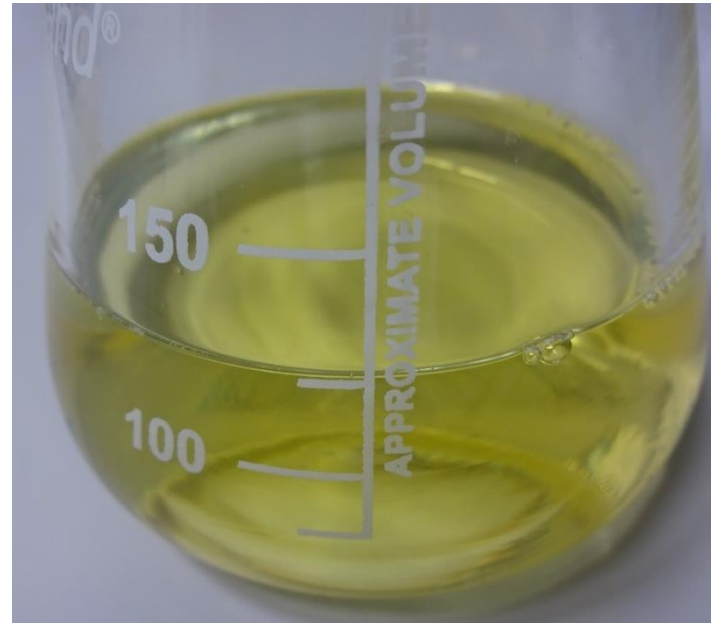
Archibald Orr Ewing (AOE) dyestuffs ledger  
 University of Glasgow Archive Services, Records of United Turkey Red  
 Co Ltd, GB248, UGD13/4/1.

# Turkey red dyeing process

## Oiling

- Olive oil
- Castor oil
- Turkey-red Oil
- Sesame oil
- Linseed-oil
- Fish oil

- Repetitive treatment with rancid olive oil mixed with alkali, and frequently cow or sheep dung followed by wringing, washing and drying
- 1870's – Turkey red oil introduced – one step oiling.

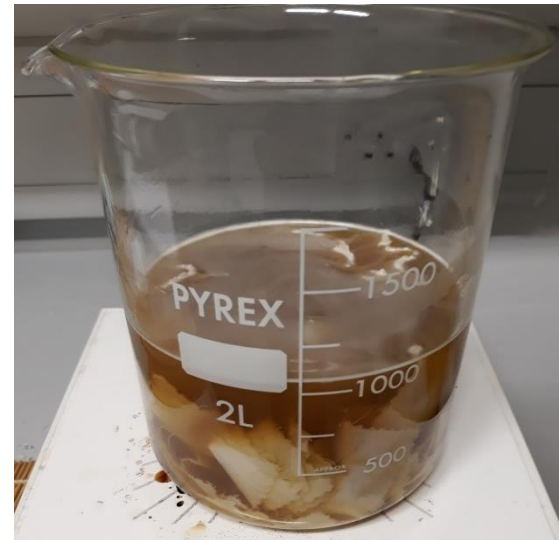


Oiling with Turkey red oil

# Tanning

- ❑ **Sumac leaves**
- ❑ **Gallnut**
- ❑ **Tannins**

- ❑ Optional step; however, most TR process descriptions included this step.
- ❑ Introduces tannins to the fibre and renders it capable of fixing a larger quantity of 'mordant' and helps in ultimately acquiring a fuller colour.



**Tanning with sumach leaves**

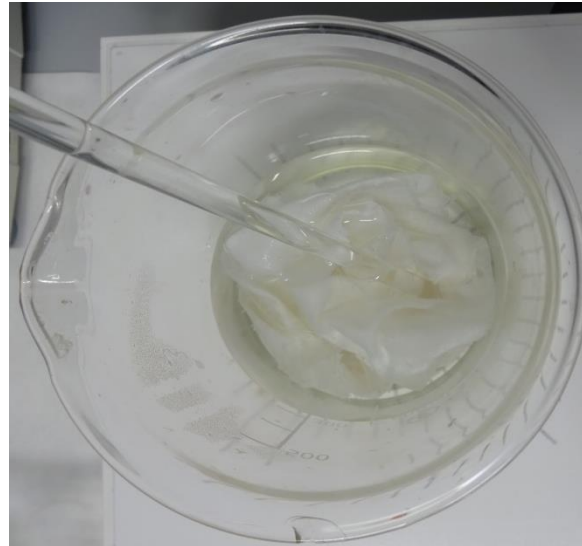
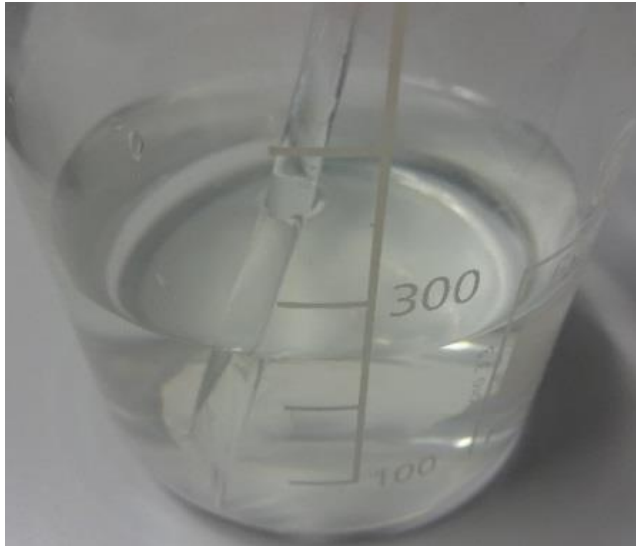


# Mordanting

## Aluminium salts

- **Potash alum**
- **Sod alum**
- **Aluminium acetate**
- **Aluminium sulphate**
- **Aluminium formate**
- **Aluminium oxide**

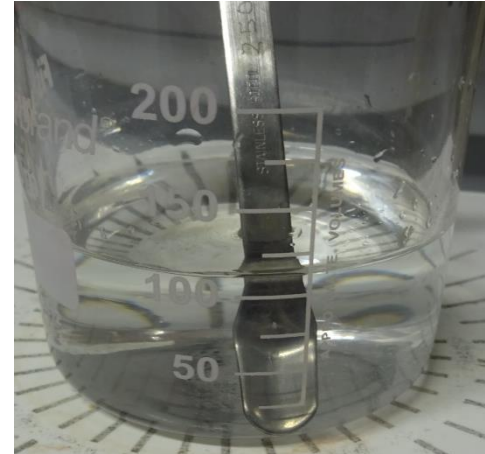
- Because of strong affinity of aluminum ions towards cellulose fibres and anthraquinone dyes, it could readily serve as a bridge between the fiber and dye.
- A typical mordanting bath was prepared by making an alkaline solution of an aluminium salt with soda ash.
- Well-oiled cotton (often tanned) were mordanted in prepared mordant bath at elevated temperature.



**Mordanting with aluminum acetate**

# Use of dung and blood

- Blood
- Blood albumen
- Cow or Sheep dung
- Intestinal fluid of slaughtered animals
- Dung Substitute
  - ✓ Phosphates
  - ✓ Arsenates
  - ✓ Silicates
  - ✓ Gelatine



- Concept of animalization**
- Bleaching and brightening effect**
- Removal of superfluous mordants**



**Phosphate treatment**

# Dyes and dyeing

## *Rubia tinctorum*

- Common madder/Dyer's madder
- Because of higher concentration by weight of dye molecules (specifically alizarin)
- The varieties of madder in commerce were distinguished by the name of the country of origin.
- Britain was the largest consumer of madder in the mid-19<sup>th</sup> c., its textile industry taking about a third of world export.

*'In 1859 the Dalquhurn works of Stirlings at Renton were dyeing 18 million yards of Turkey Red fabric and 800,000 lb. of Turkey Red yarn per annum.'* R. A. Peel, 1962, JSDC



**Dried Rubia tinctorum roots**



**Ground Rubia tinctorum roots**

- The amount of madder consumed by the Turkey red industry, its cost, and the transport required to ship it to dyehouses motivated dyers and chemists to find a more efficient alternatives.

# Garancine and other semi-synthetic madder products

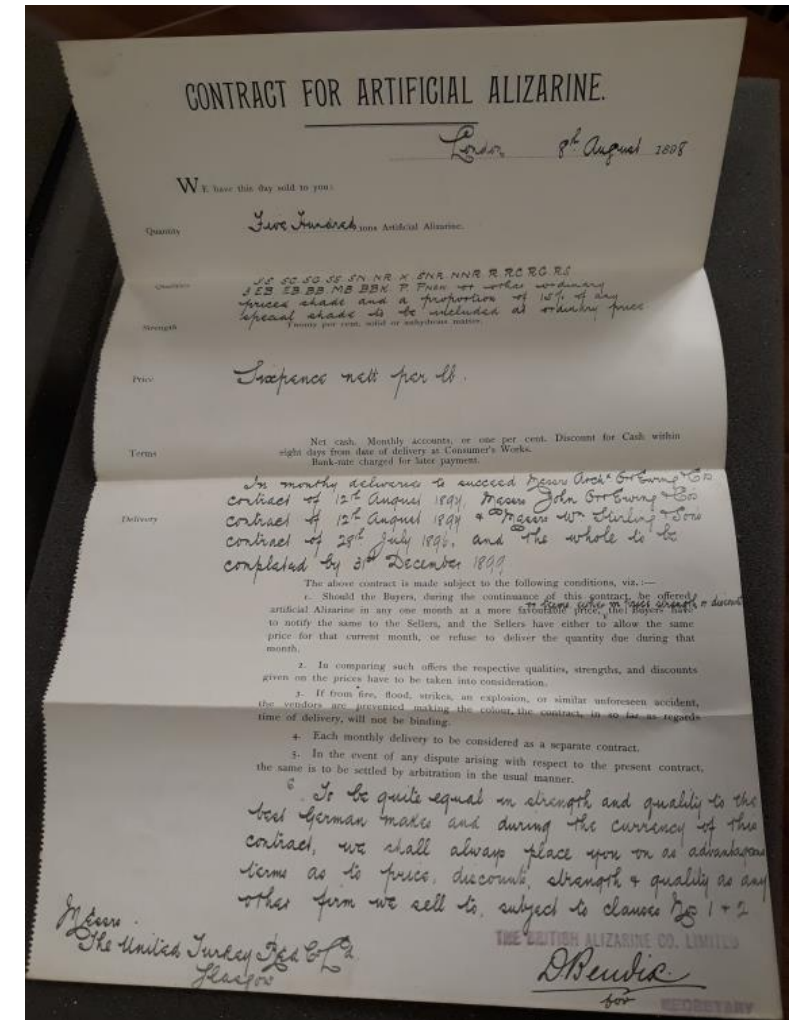
- Robiquet and Colin (1826) isolated the coloring principles of madder – alizarin and purpurin.
- Concentrated madder products - Garancine, colorine and garanceux
- Most important of these concentrated madder derivatives was **garancine**, patented by Colin, Robiquet, and Lagier in 1828.
- Within a decade it was adopted in the French dyeing centres of Rouen and Alsace.
- In 1843, Fredrick Steiner patented a method of producing garancine from refuse madder
- Garancine - an intermediate product overlapping the use of both madder and alizarine.
- The AOE dyestuffs ledger records the use of garancine in Turkey red dyeing upto 1886.



A bottle of historical garancine.  
©Catalyst Science Discovery Centre.

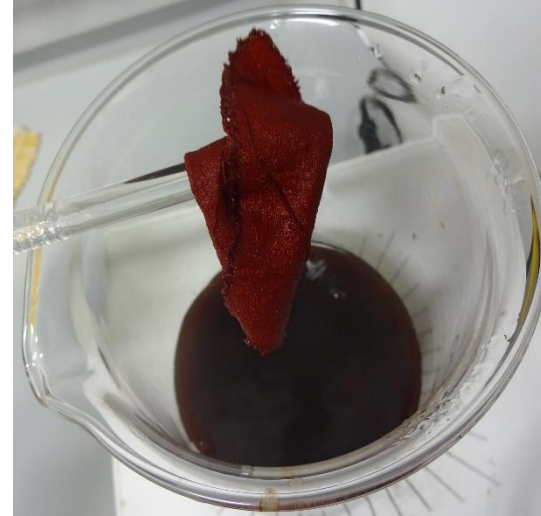
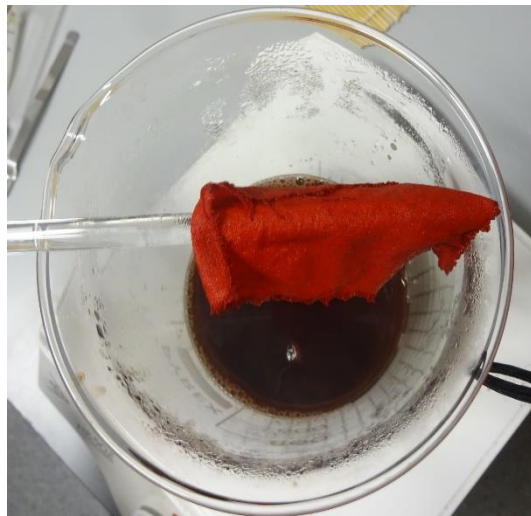
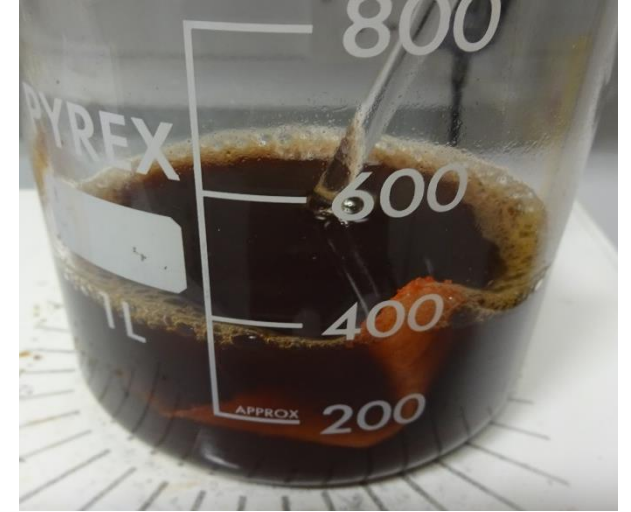
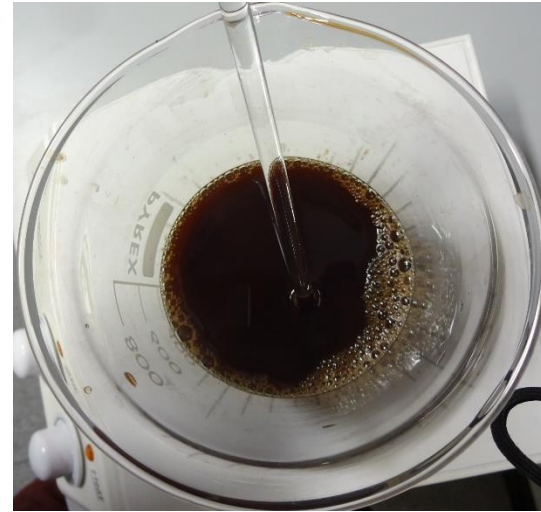
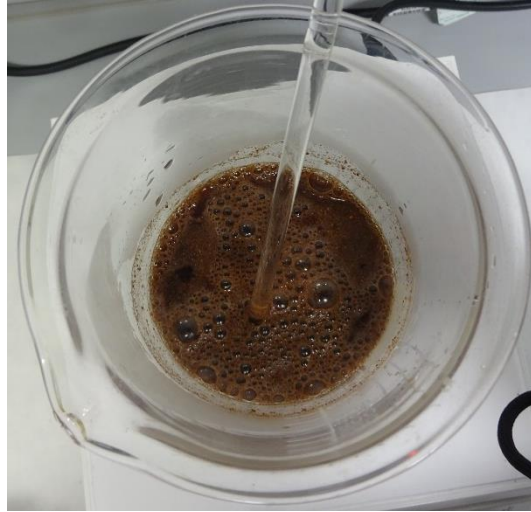
# Alizarin

- By the mid-1870s alizarin superseded madder in the Turkey red industry.
- The AOE ledger provides concentrations, amount and price of alizarin used, but no manufacturer is identified.
- The archive contains three contracts for synthetic alizarin
  - ✓ 1898 with the British Alizarine Company
  - ✓ Two from 1899 and 1900 with Meister Lucius & Brüning
- Turkey Red oil patent (1872) and introduction of short process by the use of the alizarin on TRO.



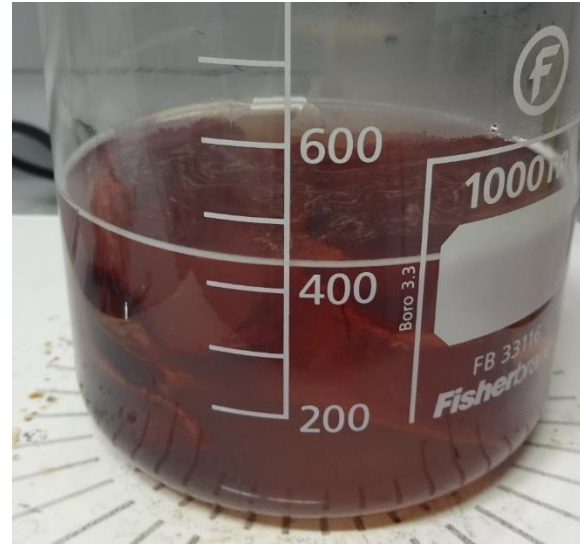
Contract between the British Alizarine Company and United Turkey Red in 1898, University of Glasgow Archive Services, Records of United Turkey Red Co Ltd, GB248, UGD13/5/13/3/4.

# Dyeing



**Dyeing with madder root extract**

# Clearing



**Clearing with Marseilles soap**

## Common dyeing



**Madder**

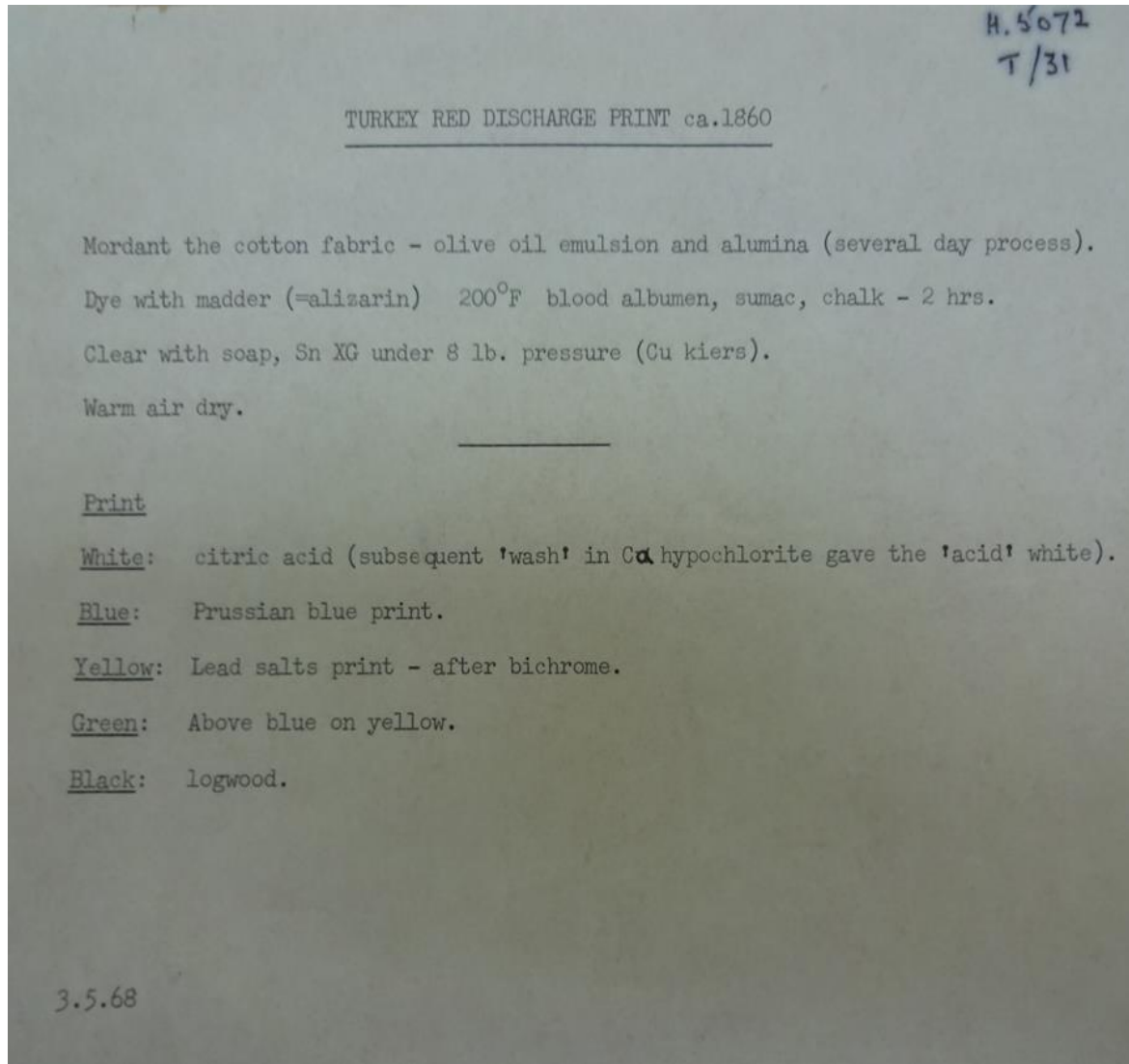
**Alizarin**

## Turkey red dyeing





# Turkey red discharge printing



BRFTA.2012.9.1



BRFCM2005.1.170 BACK

# Turkey red discharge printing process

## White

- Make a acidified paste with thickening agent
- Apply to the cloth using the printing block or pattern roller.
- Pass through the liquid bleach which reacts with this paste, removing the colour only in where the pattern is.



UGD 13/8/9



UGD 13/8/5

## Blue

- Acidified paste with a bleach-resistant blue dye



UGD 13/8/6



UGD 13/8/5

## Yellow

- Acidified paste mixed with lead nitrate.
- After bleaching the fabric, dip it in another solution of potassium bichromate.

## Green

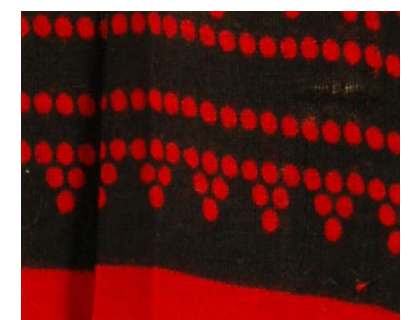
- Combination of blue and yellow

## Black

- Acidified paste mixed with logwood extract



UGD 13/8/5



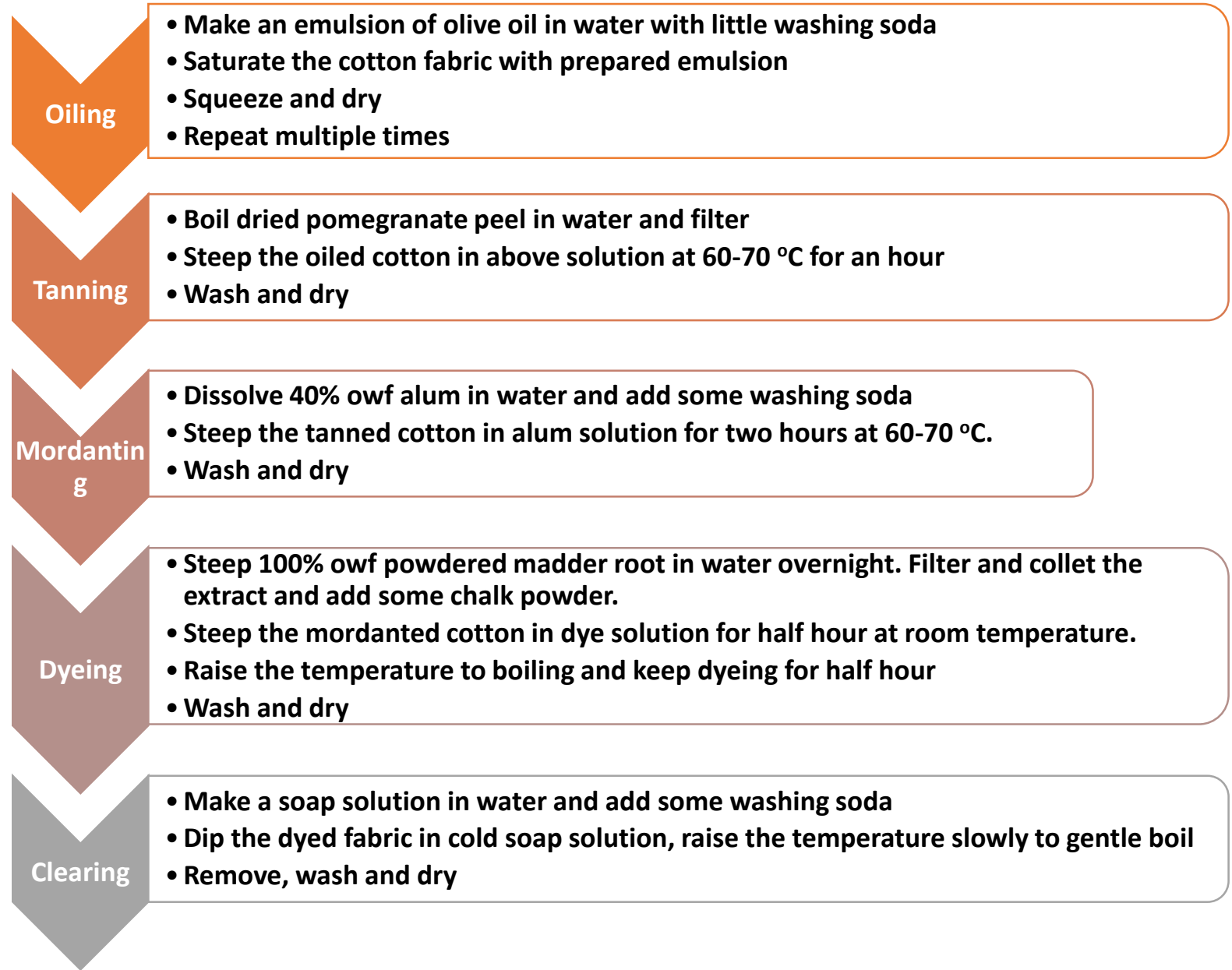
UGD 13/8/9

# Creating Turkey red imitation at home

## Process

### Materials required

- Cotton fabric
- Olive oil
- Washing soda
- Pomegranate peel
- Alum
- Madder root
- Chalk powder
- Soap



# Thank You!



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