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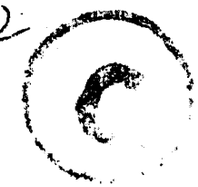

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The Dismounting of »Dry Mounted« Photographic Prints

by A. D. BAYNES-COPE

For the purposes of storage and display, photographic prints are usually »dry-mounted« onto card (also called »carton« or »board«), that is, they are fastened down with a thermoplastic adhesive. The normal process is that a layer of tissue coated on both sides is interposed between the card and the back of the print and the assembly is heated, under pressure, for a few minutes.

Traditionally, the »dry-mounting tissue« is a thin (impermeable) tissue coated on both sides with a preparation of shellac. The advantages possessed by shellac for this purpose are that it is heat sensitive, melting at temperatures below 100° C (which will not damage paper during the short period of contact), it is not tacky when cold, does not creep when cold and yet is flexible enough to allow for the limited movements of the card that occur when the card is stored in a climate with fluctuating relative humidity. It is not affected by, and is in fact impermeable to water so that in wet conditions the print does not become detached and it is not readily attacked by moulds.

Shellac does, however, have one disadvantage. It is a natural polymer (a poly-lactone) and with the passage of time the degree of polymerisation increases until the resin becomes no longer soluble in ethanol, the solvent normally used for it. The result of this is that, after a decade or so, dry-mounted prints cannot be removed from the card to which they are fastened by attempting to dissolve the shellac with alcohol.

It became necessary recently to examine the possibility of dismounting and remounting several hundred photographic prints in connection with the re-organising of the methods of storage of this Laboratory's photographic records of conservation work and the need arose for an expeditious method of dismounting these prints.

It was known that there are organic solvents which will soften aged shellac, the most commonly used being ethyl lactate and the »cellosolves« viz. methyl cellosolve (ethylene glycol mono-methyl ether, 2-Methoxy ethanol) and ethyl cellosolve, (ethylene glycol mono ethyl ether, 2-Ethoxy

ethanol). Ethyl lactate is not readily recoverable after use and is considerably more expensive than the cellosolves. It was, therefore, decided to devise a method of dismounting using methyl cellosolve, since previous experience in the use of this solvent to remove shellac from the surface of a celestial globe suggested that it would be suitable for this purpose.

Experiments showed that the porous card was readily penetrated by the solvent and would fall away from the tissue in a few hours but that the tissue, being heavily beaten, was almost impermeable as was the gelatine layer of the photograph. The solvent permeated through the paper layer of the photograph until, after about 24 hours soaking, the tissue would fall away from the print. Photographic paper is of high quality and organic solvents such as ethers and alcohols are known to be without significant effect on the strength of paper. It was therefore decided to ignore any possible weakening effect of the solvents used on the paper.

The method of dismounting was carried out as follows:

1. The prints were peeled away from the card, rather than cut out, so that only a thin layer of the card remained attached to the tissue.

2. The prints were packed loosely, upright, in glass tanks which were filled with methyl cellosolve, covered with glass plates and left in a fume cupboard overnight. (The size of the glass tanks is a matter of covenience. Those available in this laboratory were 25 cm high × 14 ×8 cm and 20 cm high × 9 × 5 cm. These contained, together, about 140 prints).

3. The next day, the methyl cellosolve was syphoned off and replaced by methanol, to rinse out the cellosolve, which has a high boiling point.

4. After about 4 hours the methanol was syphoned off and the mass of prints removed.

The prints were laid on a clean polyethylene grid in the fume cupboard to dry, and the remnants of tissue and card were lifted away. As they were removed, they were dropped in a bucket containing a solution of 2% (approx.) w/v of sodium carbonate in water. This diluted the methanol and dissolved any residual resin so that, at the end of the operation, the remnants could be squeezed out and placed in a waste bucket, the solution being poured down the sink. Thus the overall bulk of the waste paper was reduced to a few handfuls and there was no difficulty in handling several fragments of paper wet with an inflammable solvent.

It was found that a considerable amount of brown material dissolved out into the cellosolve, (presumably both shellac and colouring matter from the card) so that it could not be re-used more than three times. The amount of the higher boiling methyl cellosolve rinsed out into methanol was enough to slow down the final stages of the drying of the prints and therefore, although the methanol was not much discoloured, each batch was used only twice.

It was observed that some of the prints acquired a yellow stain in the gelatine layer but it was found that this could be removed almost completely by conventional water washing.

There are other factors to be considered in the use of methyl cellosolve and methanol. Both these solvents are inflammable and toxic. Methyl cellosolve has a flash point of 115° F (45° C) and a Threshold Limit Value of 25 ppm. Methanol has a flash point of 54° F (12° C) and a Threshold Limit Value of 200 pm. The operations described must therefore be carried out in a fume cupboard fitted with an efficient exhaust draught or in a similar well ventilated area.

The methyl cellosolve was recovered by distillation in the usual apparatus. The methanol was recovered by fractional distillation through a fractionating column filled with 3 × 3 mm stainless steel Dixon Gauze Rings, collecting the sharply defined fraction boiling below 65° C.

Abstracts

Methoxy ethanol (Methyl cellosolve) can be used as a solvent to remove dry mounted photographic prints from card. This is particularly useful when the shellac used as the adhesive has aged and become insoluble in ethanol.

Le méthoxy-éthanol (méthyl-cellosolve) peut être utilisé comme solvant pour détacher les épreuves photographiques »collées à sec«. Ceci est particulièrement utile quand le shellac utilisé comme adhésif a vieilli et est devenu insoluble dans l'éthanol.

Das organische Lösungsmittel Methoxy ethanol (Methyl Cellosolve) eignet sich zur Abtrennung von Abdrücken die auf Karton kaschiert worden sind. Es ist besonders brauchbar in derartigen Fällen in welchen das als Klebstoff angewendete Schellack wegen Verälterung nicht mehr in Ethanol löslich wird.

Метоксиэтанол (метил-целлозольв) может служить растворителем при отделении от картона фотоснимков, наклеенных способом «сухой наклейки».

Это особенно важно, если шеллак, примененный в качестве клея, подвергся старению и не растворяется в этаноле.

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The Aging Behavior of Impregnating Agent-paper Systems as Used in Paper Conservation

by N. S. BAER, N. INDICTOR & A. JOEL

Introduction

Modern polymer technology has provided a large variety of materials that may be used directly or with some modification for the conservation of important paper objects. In this report we have artificially aged and evaluated two often used[1,2,3] commercial materials, poly (vinyl alcohol) (of three different molecular weights) and soluble nylon; and a third, new material, Regnal[4] for which no reports exist in the literature of conservation.

Our tests were applied to two different papers, newsprint and a buffered wood sulfite, and our aging procedure consisted of the exposure of treated and untreated paper samples to oven temperatures of 100° C for periods of up to 16 days.[5,6]

The experimental tests for evaluating the impregnating agent-paper system were: fold endurance, surface pH, objective color, and reflectance.

Experimental

Materials and Methods of Application. Paper samples were of two kinds: buffered wood sulfite paper (Gracie & Sons Acid-Free Lining Paper – Lot 3 supplied by Charles R. Gracie & Sons, Inc., New York, N. Y. 10022) and newsprint (Aquabee Novel News 887 Rough). Samples were all cut in 0.5×6 in. (1,27×15,24 cm) strips in the same machine direction. Impregnating agents were of three different types: soluble nylon, Zytel 61, used as a 5 % 90/10 methanol/water solution; poly (vinyl alcohol, of three different molecular weights, used as 5 % aqueous solutions; Regnal (an alcohol soluble copolymer). The manufacturer's data and related information are summarized in Table 1. The concentration and environmental conditions for the application of Regnal are given in Table 1a. Test data for the unaged and artificially aged untreated paper are reported for aging times

TABLE 1: Manufacturer's data and related information for impregnating agents.

Products	Supplier	Form supplied	Form used	Other information supplied by manufacturer
Poly (vinyl alcohol) U229	J. T. Baker	Powder	5% in water [4]	99-100% hydrolyzed-viscosity for 4% aqueous solution at 20° C: 4–6 cp.
Poly (vinyl alcohol) U228	J. T. Baker	Powder	5% in water	99-100% hydrolyzed-viscosity for 4% aqueous solution at 20° C: 28–32 cp.
Poly (vinyl alcohol) U227	J. T. Baker	Powder	5% in water	99–100% hydrolyzed-viscosity for 4% aqueous solution at 20° C: 55–65 cp.
Regnal Copolymer	World Patent Development Corporation	5% stock solution [2, 3]	Full strength; 1/2 dilution with absolute alcohol	Hoppler viscosity for 5% solution at 25° C: 42.2 cp.
Zytel 61 [1]	E. I. duPont Electrochemicals Department	1/8 in. cubes	5% solution in 90/10 methanol water	Brookfield viscosity (No. 2 spindle for 10% solution in 85/15 methanol/water at 25° C: 39 cp.

1. Currently available as Elvamide 8061
2. The major component in the solvent is ethanol
3. The product is also supplied with a 5% Mg $(C_2H_3O_2)_2$ buffer
4. All solute percentages are given by weight

TABLE 1a: Conditions tested for the application of Regnal.

	Conditions		
	Regnal solution %	Mg $(C_2H_3O_2)_2$ buffer %	Relative humidity %
I	5	–	43
II	2.5	–	43
III	2.5	2.5	43
IV	5	5	43
V	5	5	67
VI	5	–	67

of 0, 1, 5, 9, and 16 days in Table 2. The procedure for applying the impregnating agent to the paper consisted of brushing the impregnating solution on a single side of the test paper and permitting the solvent to evaporate in controlled atmospheres for 24 hours. Instructions for the application of Regnal specify a relative humidity of less than 50%, 20–25° C, at the time of application.[7] When applied at higher humidities the surface appears cloudy and opaque when dry.

Aging of Samples. The treated and untreated blank samples were placed in an oven at 100° C for periods of 1, 5, 9, 16 days. On the completion of each aging period 6 replicate specimens were removed and equilibrated at 21 ± 1° C, 65% relative humidity for 24 hours.

Folding Endurance Tests. Measurements were performed on a Tinius-Olsen Model No. 2 instrument (also known as Folding Endurance Tester (MIT) according to ASTM method D2176-63T on samples cut in the same machine direction. A dead weight of 1/2 pound was used for all newsprint samples and 1 1/2 pounds for all Gracie paper. Results are reported as the average of six measurements together with standard deviation. Standard deviations were somewhat higher for newsprint than for the Gracie paper, undoubtedly a measure of the uniformity of the papers. All tests were performed in a constant temperature/humidity room (21 ± 1° C, relative humidity 65%).

pH Measurements. Duplicate readings were taken on both sides of the test strips with a Beckmann 39182 Flat Bulb pH combination electrode

TABLE 2: Tests of artificially aged[1] untreated paper.

Aging time Days	Double folds to rupture[2]		pH		Munsell colors[5]		Reflectance[7]	
	Gracie paper[3]	Newsprint[4]	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint
0	14 ± 3	26 ± 21	7.5	4.6	> 5Y9/1[6]	(5Y9/1–2.5Y8/2)	86	54
1	14 ± 3	24 ± 12	7.2	4.6	> 5Y9/1	(2.5Y9/2–2.5Y8/2)	81	51
5	16 ± 4	12 ± 6	7.4	4.3	> 5Y9/1	(2.5Y8/2)	79	47
9	13 ± 3	3 ± 1	7.0	4.4	> 5Y9/1	(10YR8/4–10YR8/2)	77	44
16	12 ± 3	1 ± 1	7.0	4.5	> 5Y9/1	(10YR8/4)	72	38

1. Oven temperature 100° C; all specimens equilibrated at 21 ± 1° C, 65 % Relative humidity for 24 hours prior to measurement
2. Average and standard deviation of six measurements
3. 1.5 pound counterweight
4. 0.5 pound counterweight
5. Observed under »Tensor« incandescent illumiantion
6. The symbol > means brighter than
7. At 457 nm

with a 2 minute equilibration period. Results are reported as the average of eight readings on two test strips. These averages have an uncertainty of ± 0.2 pH units.

Color Changes. The color of the test strips was compared with that of the standard Munsell colors[8] with incandescent »Tensor« lamp illumination. Where the observed color corresponded to no single designation the two nearest bounding colors were recorded.

Reflectance. The reflectance was measured at 457 nm with a Bausch and Lomb Color Analyzer Reflectance Attachment on a Spectronic 20 Colorimeter. Results are reported as the average reading for three samples. Observations are reported for the coated side only. These averages have an uncertainty of ± 1 % unit.

DISCUSSION OF RESULTS

Folding Endurance Tests. Tables 3 and 4 present the numerical data for the folding tests. (For all subsequent tables the data for untreated papers are included for comparison). The results for untreated paper clearly indicate that oven heating at 100° C has no measurable deleterious effect upon the fold-strength of the Gracie paper, but that the newsprint shows marked deterioration within the time span of our experiments. There is also a marked distinction between the standard deviations of the two sets of measurements indicating, as expected, greater uniformity in the Gracie paper. Higher numerical values for the initial newsprint data arise from use of a lower counterweight in the testing apparatus. The apparent imperviousness of the Gracie paper to oven temperatures of 100° C enables us to attribute diminished performance of an impregnating agent-paper system entirely to the impregnating agent.

Table 3 shows results of aged papers treated with 5 % solutions of soluble nylon and poly (vinyl alcohol) of three different molecular weights. Examination of the standard deviations again shows markedly higher values for newsprint than for Gracie paper. The average standard deviations are 25 % for Gracie paper and 60 % for newsprint. The similarity in these values as compared to the untreated papers indicate that the impregnating process was sensibly uniform.

It is clear from the data that treatment with either soluble nylon or poly (vinyl alcohol) has initially improved both kinds of paper substantially. During the test period of 16 days no sample had lower fold-strength than the untreated paper comparably aged. The fold-strength

TABLE 3: Folding tests on artificially aged[1] papers treated with soluble nylon and poly (vinyl alcohol) solutions.

Aging time Days	Double folds to rupture[2]								Untreated	
	Soluble nylon[3]		Poly (vinyl alcohol)[3]							
			U229		U228		U227			
	Gracie paper[4]	Newsprint[5]	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint
0	171±23	840±335	44±6	413±101	77±14	484±170	76±23	357±204	14±3	26±21
1	147±55	556±676	32±7	408±348	66±11	249±173	72±22	197±123	14±3	24±12
5	142±42	25±12	31±6	48±29	64±19	61±12	89±17	39±22	16±4	12±6
9	89±22	8±3	30±6	15±7	58±15	16±9	58±19	20±7	13±3	3±1
16	47±11	2±1	21±5	7±2	35±10	6±3	43±21	9±3	12±3	1±1

1. Oven temperature 100°C; all specimens equilibrated at 21±1°C, 65% relative humidity for 24 hrs. prior to measurement
2. Average and standard deviation of six measurements
3. See Table 1 for description
4. 1.5 lb. counterweight
5. 0.5 lb. counterweight

TABLE 4: Folding tests on artificially aged[1] papers treated with Regnal under various buffer and humidity conditions.

Aging time Days	Double folds to rupture[2]										Untreated	
	43% Relative humidity								67% Relative humidity			
	5% solution[3] unbuffered		2.5% solution unbuffered		2.5% solution 2.5% buffer sol.		5% solution 5% buffer sol.		5% solution 5% buffer sol.		5% solution unbuffered			
	Gracie paper[4]	Newsprint[5]	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint
0	67±18	82±69	64±10	59±32	50±22	25±3	70±17	17±5	72±11	24±17	96±35	42±18	14±3	26±21
1	72±10	39±31	53±13	28±15	38±13	12±5	68±9	22±11	–	27±20	77±25	34±13	14±3	24±12
5	48±6	5±2	46±12	12±11	27±7	8±5	32±6	20±7	34±10	20±11	65±10	20±13	16±4	12±6
9	34±10	2±1	29±9	2±1	14±2	6±5	19±4	4±1	14±2	10±3	26±7	6±1	13±3	3±1
16	14±2	1±1	–	–	–	–	8±1	4±2	10±1	6±3	16±4	2±1	12±3	1±1

1. Oven temperature 100° C; all specimens equilibrated at 21±1° C, 65% relative humidity for 24 hrs. prior to measurement
2. Average and standard deviation of six measurements
3. Refer to Tables 1 and 1a
4. 1.5 lb. counterweight
5. 0.5 lb. counterweight

improvement obtained from soluble nylon was substantially greater than that obtained from poly (vinyl alcohol). The rate of fold-strength loss from both soluble nylon and poly (vinyl alcohol) was similar. The differences among the poly (vinyl alcohol) samples were more subtle than the differences between kinds of impregnating agent. There appears to be a small and uncertain trend observable for the Gracie paper implying that higher molecular weight poly (vinyl alcohol) contributes more to the fold-strength than does lower molecular weight material. The scattered data for newsprint impregnation does not allow even that modest distinction to be made among the poly (vinyl alcohol) agents. It is, however, resonable to expect higher molecular weight material that is undergoing degradation to continue to impart strength properties longer than lower molecular weight material. This leads us to suggest that impregnating agents of higher molecular weight will have superior aging properties, all other factors being equal.

Table 4 presents in some detail the folding test results from aged paper samples impregnated under a variety of conditions with Regnal, a new impregnating agent, not heretofore reported in the literature of conservation.

The overall fold test results are comparable to those of poly (vinyl alcohol) rather than to soluble nylon. Both kinds of paper under all conditions studied lose fold-strength down to but not below the fold-strength of untreated paper at comparable aging periods. Here again, as for the other impregnating agents, the data for Gracie paper strongly imply that only the impregnating agent is affected by the aging process; whereas the data for newsprint show the complex effect of the aging of the paper-impregnating agent system.

There appears to be little, if any, observed difference in fold-strength properties of Gracie paper treated by Regnal at different concentrations, with or without buffer, and under different (47 % and 65 %) relative humidity conditions. The system is, in fact, indistinguishable by fold tests from the general behavior of Gracie paper treated with poly (vinyl alcohol).

The newsprint treated with Regnal, however, behaves somewhat differently. Although initially the fold-strength is increased compared with untreated newsprint it is consistently below fold-strengths obtained for the poly (vinyl alcohols) or soluble nylon. At the longest aging period these distinctions are less certain since the number of double folds is small.

pH Measurements. Tables 5 and 6 present data for the measurement of surface pH of the untreated papers and the impregnated papers.

TABLE 5: pH of artificially aged[1] papers treated with soluble nylon and poly (vinyl alcohol) solutions.

Aging time Days	Soluble nylon[2]		Poly (vinyl alcohol)[2]				Untreated	
			U229		U228			
	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint
0	6.8	4.5	7.2	4.6	7.1	4.6	7.5	4.6
1	7.1	4.4	7.1	4.6	7.1	4.6	7.2	4.6
5	6.9	4.6	7.1	4.5	7.0	4.4	7.4	4.3
9	6.8	4.4	6.9	4.5	7.2	4.4	7.0	4.4
16	7.0	4.4	7.1	4.5	6.9	4.4	7.0	4.5

			U227					
0			7.0	4.7				
1			7.0	4.9				
5			7.1	4.8				
9			7.1	4.5				
16			7.0	4.6				

1. Oven temperature 100° C 2. See Table 1 for description

TABLE 6: pH of artificially aged[1] papers treated with Regnal under buffer and humidity conditions.

Aging time Days	43 % Relative humidity								67 % Relative humidity				Untreated	
	5 % solution[2] unbuffered		2.5 % solution unbuffered		2.5 % solution 2.5 % buffer sol.		5 % solution 5 % buffer sol.		5 % solution 5 % buffer sol.		5 % solution unbuffered			
	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint
0	7.1	4.8	6.9	4.7	9.2	8.6	8.9	8.2	9.4	8.8	7.1	–	7.5	4.6
1	7.1	4.7	6.9	4.5	9.0	8.6	9.4	8.6	9.4	9.0	6.9	4.4	7.2	4.6
5	7.5	4.5	7.1	4.4	9.3	8.6	9.5	9.0	9.1	8.5	7.0	4.5	7.4	4.3
9	7.1	4.5	7.0	4.6	9.2	8.3	9.7	9.0	9.2	8.5	6.8	4.5	7.0	4.4
16	7.0	4.5	7.0	4.5	9.6	8.4	9.8	9.1	9.6	8.4	6.5	4.5	7.0	4.5

1. Oven temperature 100° C
2. Refer to Tables 1 and 1a

TABLE 7: Munsell colors[1] of artificially aged[2] papers treated with soluble nylon and poly (vinyl alcohol) solutions.

Aging time Days	Soluble nylon[3]		Poly (vinyl alcohol)[3]						Untreated	
			U229		U228		U227			
	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint
0	>10YR9/1[4]	10YR8.5/2	10YR9/1	10YR9/2	10YR9/1	10YR9/2	10YR9/1	10YR8.5/2	>5Y9/1	5Y9/1-2.5Y8/2
1	>10YR9/1	10YR8.5/2	10YR9/1	10YR9/2-10YR8/2	10YR9/1	10YR8.5/2	10YR9/1	10YR8.5/2	>5Y9/1	2.5Y9/2-2.5Y8/2
5	>10YR9/1	10YR8.5/2	10YR9/1	2.5Y8.5/2-10YR8.5/2	10YR9/1	10YR8.5/2	10YR9/1	10YR8.5/2	>5Y9/1	2.5Y8/2
9	10YR9/1	10YR8/3-2.5Y8/4	10YR9/1	10YR8/3-10YR8.5/2	10YR9/1	10YR9/2-10YR8/2	10YR9/1	10YR8.5/2	>5Y9/1	10YR8/4-10YR8/2
16	10YR9/1	10YR7.5/4-2.5Y7.5/4	10YR9/1	10YR8.5/2	10YR8.5/1-10YR9/1.5	10YR8.5/2	10YR9/1.5-10YR9/1	10YR8.5/2	>5Y9/1	10YR8/4

1. Observed under Tensor lamp
2. Oven temperature 100° C
3. See Table 1 for description
4. The symbol > means brighter than

TABLE 8: Munsell colors[1] of artificially aged[2] papers treated with Regnal under various buffer and humidity conditions.

Aging time Days	43% Relative humidity								67% Relative humidity				Untreated	
	5% solution[3] unbuffered		2.5% solution unbuffered		2.5% solution 2.5% buffer sol.		5% solution 5% buffer sol.		5% solution 5% buffer sol.		5% solution unbuffered			
	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint
0	>5Y9/1[4]	5Y9/1-2.5Y8/2	>5Y9/1	5Y9/1-2.5Y8/2	>5Y9/1	2.5Y9/2-2.5Y8/2	>5Y9/1	2.5Y9/2-2.5Y8/2	>5Y9/1	2.5Y8/3-2.5Y8/4	>5Y9/1	7.5YR8.5/2	>5Y9/1	5Y9/1-2.5Y8/2
1	>5Y9/1	2.5Y9/2-2.5Y8/2	>5Y9/1	2.5Y9/2-2.5Y8/2	>5Y9/1	2.5Y9/2-2.5Y8/4	>5Y9/1	2.5Y9/2-2.5Y8/4	>10YR9/1	2.5Y8/4	>5Y9/1	10YR8/3-10YR7.5/2	>5Y9/1	2.5Y9/2-2.5Y8/2
5	>5Y9/1	2.5Y9/2-2.5Y8/4	>5Y9/1	2.5Y9/2-2.5Y8/4	>5Y9/1	2.5Y8/4-2.5Y8/2	>5Y9/1	2.5Y8/4-2.5Y8/2	>10YR9/1	10YR8/3-2.5Y8/3	>5Y9/1	10YR8.5/2	>5Y9/1	2.5Y8/2
9	>5Y9/1	10YR8/4-2.5Y8/4	>5Y9/1	10YR8/4-2.5Y8/4	5Y9/1	2.5Y8/4	5Y9/1	2.5Y8/4	2.5Y9/2	10YR8/4	5Y9/1-2.5Y8/3	10YR8/4	>5Y9/1	10YR8/4-10YR8/2
16	5Y9/1-5Y9/12	10YR8/4-10YR7/4	5Y9/1-5Y9/12	10YR8/4-10YR7/4	5Y9/2-2.5Y9/2	2.5Y8/4-2.5Y7/4	5Y9/2-2.5Y9/2	2.5Y8/4-2.5Y7/4	10YR9/2	10YR8/4	5Y9/2	10YR8/4-10YR7.5/4	>5Y9/1	10YR8/4

1. Observed under Tensor lamp
2. Oven temperature 100° C
3. Refer to Tables 1 and 1a
4. The symbol > means brighter than

No trend in pH values could be detected when compared with artificial aging times. Surface pH values for either newsprint or Gracie paper were essentially independent of impregnating agent. Each of the impregnating agents left the acidic properties of the papers unchanged and appear to have no effect even upon aging.

Paper impregnating systems were successfully buffered with magnesium acetate buffer solutions and the buffering action was retained throughout the artificial aging.

These results indicate clearly no correlation between surface pH data and fold-strength data. It suggests, in fact, that here the surface pH change is an insufficient criterion of paper deterioration; for example, the newsprint strips could be successfully buffered to pH comperable to that of Gracie paper without improvement of fold-strength on aging. These data suggest that although the acidity in paper may be an important cause of deterioration, as other investigators have proposed, this property may be altered without substantial strength improvement to the paper on aging. The relationship of pH to paper is undoubtedly a complex one and cannot possibly be applied without attention to strength properties.

Color Changes. Tables 7 and 8 present Munsell color designations for artificially aged treated and untreated papers.

For untreated papers it may be seen that Gracie paper showed no detectable color change at 100° C over the 16 day heating period while newsprint, initially light-yellow, slowly turned yellow-red.

Treated papers (Tables 7 and 8) heated at 100° C all showed slight intensification of the yellow-red coloration during the course of artificial aging. According to the Munsell designation the changes appear to be small. Distinctions among the impregnating agents on the basis of color evaluation could not be made. All impregnating agents seemed to be equally acceptable

in terms of color stability. The color effects of these impregnating agents on the inks, dyes, or pigments attached to paper ought to be taken into account before treatment. In particular, the effects of the various solvents from which the impregnating agents are applied must be considered.

Reflectance. The reflectance measurements (%) at 457 nm of treated and untreated papers is presented in Tables 9 and 10.

The untreated papers show a monotonic decrease in reflectance. Apparently these measurements are *more* sensitive to the effects of artificial aging even than fold tests since the Gracie paper showed essentially no change in fold test strength even after 16 days of heating at 100° C although an appreciable change in reflectance was observed.

Tables 9 and 10 also show monotonic decreases in the reflectance with artificial aging. In general, the Gracie paper shows an average decrease in reflectance of about 15% while the newsprint shows a decrease of about 25%. Subtler distinctions may be made among the different impregnating agents reinforcing quantitatively the discernible surface effects obtained by artificial aging. Soluble nylon and poly (vinyl alcohol) show less reflectance change than Regal or the untreated papers.

The absence of correlation between reflectance values and fold test values is not surprising since reflectance is really a composite property encompassing both chemical and physical effects. The sensitivity of these measurements to artificial aging suggests that this property plus fold strength tests may provide an adequate and sensitive procedure for the evaluation of paper and paper related systems.

It has been reported[1] that soluble nylon is insufficiently reversible for use in paper conservation. Though this criterion is not as critical for impregnating agents as it is for adhesives, we are currently investigating the characteristics of these materials as part of a larger study of the reversibility of adhesives and similar materials used in paper conservation. In our most recent experiments samples of soluble nylon were entirely reversible from glass plates in 90/10 v/v methanol/water at 21 ± 2° C over the range of aging times.

ACKNOWLEDGEMENTS

The work and experiments described in this study benefitted greatly from the advice of Professor L. J. Majewski. The authors thank the World Patent Development Corporation for a grant towards the support of this work. The authors are indebted to Mr. L. Hoffman who made some of the measurements.

TABLE 9: *Reflectance at 457 nm (%) of artificially aged[1] papers treated with soluble nylon and poly (vinyl alcohol) solutions.*

Aging time Days	Soluble nylon[2]		Poly (vinyl alcohol)[2]						Untreated	
			U229		U228		U227			
	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint	Gracie paper	Newsprint
0	81	51	86	52	85	52	85	52	86	54
1	80	47	83	50	82	50	83	51	81	51
5	73	45	80	47	78	47	78	48	79	47
9	73	41	79	45	77	45	78	45	77	44
16	72	39	78	43	76	41	74	42	72	38

1. Oven temperature 100° C

2. See Table 1 for description

TABLE 10: Reflectance of artificially aged[1] papers treated with Regnal under various buffer and humidity conditions.

Aging time Days	43% Relative humidity				67% Relative humidity				Untreated	
	5% solution[2] unbuffered		2.5% solution unbuffered		5% solution 5% buffer sol.		5% solution unbuffered			
	Gracie paper	News-print	Gracie paper	News-print	Gracie paper	News-print	Gracie paper	News-print	Gracie paper	News-print
0	83	51	85	51	83	48	85	51	86	54
1	81	48	83	49	81	46	82	50	81	51
5	75	43	78	46	77	42	79	47	79	47
9	73	41	73	38	70	41	71	44	77	44
16	66	36	68	35	67	39	66	40	72	38

1. Oven temperature 100° C

2. Refer to Tables 1 and 1a

ABSTRACTS

The effects of accelerated aging on the folding endurance strength, reflectance, objective color of the system, and pH, of newsprint and a buffered wood sulfite paper have been observed. The same papers treated with three different types of impregnating agents, recommended for use in paper conservation, were also artificially aged and tested for folding endurance strength, etc. The impregnating agents were soluble nylon; poly (vinyl alcohol) of three different molecular weights; and Regnal, a new alcohol soluble copolymer.

All impregnating agents gave substantial initial increase in folding endurance strength, with soluble nylon most effective. Artificial aging (100° C oven exposure for up to 16 days) invariably caused decreases in folding endurance strength. The results strongly suggest that no deleterious effect is produced by the impregnating agents, but that the strengthening effect of all three agents declines independently of the paper. The effects of a wide variety of application procedures are presented for Regnal.

Eleven tables of data are included. Two describe the impregnating agents studied (Tables 1 and 1a); one describes tests on the untreated artificially aged papers (Table 2); and the remaining nine describe fold tests (Tables 3 and 4), pH measurements (Tables 5 and 6), Munsell colors (Tables 7 and 8), and reflectance (Tables 9 and 10) of treated samples.

On a observé les effets d'un vieillissement accéléré de papier journal et de papier tampon de fibre de bois traité au sulfite sur la résistance au pliage, la réflectance, la couleur objective du système et le pH du papier. Les mêmes papiers, traités avec trois sortes d'agents d'imprégnation différents recommandés pour la conservation du papier, furent soumis au vieillissement artificiel et à la résistance au pliage, etc. Les agents d'imprégnation utilisés étaient: du nylon soluble; de l'alcool polyvinyl de trois poids moléculaires différents, et du Regnal, un nouvel alcool soluble copolymère.

Tous les agents d'imprégnation donnèrent une augmentation initiale appréciable de la résistance au pliage, le nylon soluble étant le plus efficace. Le vieillissement artificiel (exposition au four à 100° C pendant une durée allant jusqu'à 16 jours) entraîna invariablement une diminution de la résistance au pliage. Les résults montrent clairement que les agents d'imprégnation n'ont aucun effet nuisible sur le papier, mais que l'effet de résistance des trois agents diminue indépendamment du papier. Une grande variété de procédés d'application sont présentés pour le Regnal.

Onze tableaux de données sont joints. Deux d'entre eux donnent la description des agents d'imprégnation étudiés (tableaux 1 et 1a); un tableau se rapporte aux tests des papiers artificiellement viellis non traités (tableau 2); et les neuf autres décrivent les examens de pliage (tableaux 3 et 4), les mesures de pH (tableaux 5 et 6); les couleurs de Munsell (tableaux 7 et 8) et la réflectance (tableaux 9 et 10) des échantillons traités.

Zeitungspapier und gepuffertes aus Sulfitzellstoff hergestelltes Papier wurden mit drei verschiedenen Imprägnierungsmitteln, nähmlich löslichen Nylon, Polyvinylalkohol und Regnal (einem neuen in Alkohol löslichen Kopolymer) behandelt, und einem Verälterungsverfahren (Erhitzung in einem Ofen bis 100° C bis auf 16 Tagen) unterworfen. Für alle Muster bearbeiteten und nichtbearbeiteten Papiers wirden bestimmt: die Bruchfestigkeit, Reflexionsvermögen, Azidität und Munsellfarbe.

Aus der Ergebnissen der Versuche hat es sich herausgestellt, dass alle Imprägnierungsmitteln eine wesentliche Erhöhung der Bruchfestigkeit hervorriefen, wobei das lösliche Nylon eine ausschlaggebende Wirkung zeigte. Hingegen verursachte das Verälterungsprozess eine Erniederung der Bruchfestigkeit, die von der Art des Papiers unabhängig war.

Die einzelne Resultate werden in elf Tabellen gezeigt. In zwei Tabellen (1 und 1a) werden die Eigenschaften der verschiedenen Imprägnierungsmitteln beschrieben; in Tabelle 2 werden die an den nichtbearbeiteten verälteten Papieren ausgeführten Messungen gegeben; in den anderen neun Tabellen werden die an den bearbeiteten Papieren ausgeführten Messungen wie folgt gegeben: Bruchfestigkeit (Tabellen 3 und 4); Azidität (Tabellen 5 und 6); Munsell Farbemessungen (Tabellen 7 und 8) und Reflexionsvermögen (Tabellen 9 und 10).

Изучалось влияние ускоренного старения на степень выносливости при изломе, коэффициент отражения, цвет системы и pH как газетной бумаги, так и бумаги из буфферной сульфитной древесины.

Указанные типы бумаги были подвергнуты обработке тремя различными видами пропитки, применяемыми для сохранения бумаги, после чего также подвергались искусственному старению и были испытаны на степень выносливости при изломе и т.д.

В качестве пропитки применялись растворимый нейлон, поливиниловый спирт с 3-мя различными молекулярными весами и Регналновый сополимер, растворимый в спирте. Все виды пропитки способствовали вначале значительному повышению степени выносливости при изломе, причем самым эффективным из них оказался растворимый нейлон.

Искусственное старение (тепловое старение в печи при температуре в 100°C в течение 16 дней) неизменно вызывало снижение степени выносливости при изломе.

Полученные результаты показывают, что пропитка не оказывает вредного действия на бумагу. Однако повышенная степень выносливости, вызываемая пропитками, снижается при искусственном старении независимо от качества бумаги. Даны результаты различных способов применения Регнала.

Приложены 11 таблиц с данными.

В двух таблицах указаны исследованные пропитки (табл. 1 и 1[a]); одна таблица дает описание испытания непропитанной бумаги, подвергнутой процессу искусственного старения (табл. 2); в остальных 9 таблицах дается описание: испытаний на излом (табл. 3 и 4), измерения pH, окраски по Мунселлю (табл. 7 и 8) и коэффициента отражения (табл. 9 и 10) пропитанных исследуемых образцов.

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An Organic Solvent for Dissolving Old Flour Paste

by A. D. BAYNES-COPE

It is a sine-qua-non of archival conservation that no process should be used that may not readily be reversed without risk of damage to the document but, unfortunately, this principle has not always been followed in practice. On many occasions in the past, documents or drawings made with acid ink of a type that proves to be adversely affected by water have been pasted down with flour paste onto unsuitable supports, often in a way that obliterates the text or conceals drawings that may be on the reverse side of the paper.

This type of material presents an extremely difficult problem to the conservator, for water may not be used to loosen or soften the adhesive. It has now been found that there are organic solvents that will dissolve old flour paste sufficiently to allow such documents and drawings to be detached from their supports.

Two solvents have been used in experiments carried out by the author in the Research Laboratory of the British Museum, namely, N-methyl-2-pyrrolidone and dimethyl sulphoxide, but, though the latter solvent was found to be effective in dissolving old paste, it was also found to be so unpleasant and hazardous to handle that it should not be used for this purpose.

The experiments were directed to two points of interest. (i) The effect on the document and (ii) effectiveness in dissolving old paste. It was found by experiments on waste fragments bearing writing in iron gallo-tannate ink that N-methyl-2-pyrrolidone does not dissolve this ink, when aged, to any appreciable extent. Using Whatman No. 50 Chromatography paper and Whatman No. 1 Chromatography paper, it was found that there will be a loss of folding endurance in paper treated at room temperature with this solvent and that this loss is, as might be expected, more severe with the softer, weaker paper, Whatman No 1.

Nevertheless, it can be argued that in an otherwise unenviable situation, where the text is totally inaccessible or the document is at hazard, it may be permissible to use a method that presents a known hazard to restore a

Table (1). The effect of N-methyl-2-pyrrolidone on paper.

	Folding Endurance MD.	CD.	Tearing Resistance MD.
Whatman No 1 Control	11	7	48
Soaked 7 days	6	3	38
Whatman No 50 Control	907	313	
Soaked 7 days	757	237	

document to a state in which acceptable non-aqueous conservation methods can be used to preserve it for posterity.

It was found in all cases in which N-methyl-2-pyrrolidone was used on conventionally mounted drawings, that, within a space of three days, the drawing could be detached from its support, even where two layers of paper were used as the support.

Method

The document is immersed in the solvent contained in a shallow dish, which should be covered with eg. a close fitting glass plate. At intervals the document is removed onto a glass plate so placed that it may drain into the dish and a flat, blunt spatula or dentists' »flat plastic« is inserted between the layers of paper to free any areas where adherence is slight. (The paper remains stiff whilst wet with this solvent, which facilitates handling and provides an added safety factor). Once separation is complete, the document is rinsed in a solvent such as acetone and allowed to dry.

Note: N-methyl-2-pyrrolidone has a high boiling point 200° C and flash point 40° C so that it presents but little fire hazard. Reliable information on its toxicity is remarkably scarce but enough to suggest that it should be used only in a fume cupboard fitted with an efficient exhaust draught and that the user should wear impermeable (eg. polythene) gloves whilst manipulating it, as it can be absorbed through the skin. Purification is normally by vacuum distillation and this method is clearly not suitable for use in ordinary conservation workshops. However, it appears that the solvent may be used repeatedly.

Acknowledgements

Waste experimental material was provided by Mr. J. Pye of the Carlisle and Cumberland Joint Record Office and Mr. E. Harding of the Department of Prints and Drawings, British Museum. Mr. Norman Leitman gallantly allowed this method to be used on a set of drawings by Salvator Rosa which had been unsuitably mounted. Miss. B. Savage, FRIC (British Drug Houses Ltd.) and Dr. P. L. Bidstrup, FRCP kindly provided information on the handling and hazards of the solvent. The testing of the paper was kindly carried out by the Paper Industry Research Association.

Since the submission of this article, the author has received authoritative advice on the handling of N-methyl-2-pyrrolidone from Dr. Eckhard Müller of Lurgi GMBH, and it is considered wise to expand the section on the care of handling of this material.

It should be used only in a fume-cupboard fitted with an efficient exhaust draught system. The user should wear polythene (NOT rubber) gloves when handling it and it is advisable to wear eye protection. N-methyl-2-pyrrrolidone is readily absorbed through the skin and exerts a very powerful and painful dehydrating effect. If the liquid gets onto the skin, it should be washed off immediately, using plenty of water.

The author wishes to thank Dr. Müller for his very helpful information and advice.

Abstracts

N-methyl-2-pyrrolidone will dissolve old Farinaceous paste and can be used to separate documents or drawings from their supports without appreciable loss of iron-gallo-tannate ink.

N-méthyle-2-pyrrolidone, dissolvant organique applicable à la dissolution de vieille colle de farine, s'applique aussi à separer des documents et des illustrations de leur support sans perte essentielle d'eucre ferrugineuse de gallo-tanate.

N-Methyl-pyrrolidon eignet sich zur Auflösing von Stärkekleister. Dieses Lösungsmittel kann zur Trennung von auf Karton montierte Dokumente oder Graphike in jenem Fällen verwendet werden wenn der Gebrauch von wässerigen Lösungsmitteln dadurch ausgeschlossen wird, dass die Eisengallustinte wasserempflindlich ist.

Н-метил-2-пирролидон является органическим растворителем старого клейстера, растворяющим мучной клей, и применимым в процессе отделения документов или рисунков от поддерживающих материалов без заметной потери краски галложелезного танната.

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Report of a Conference

Meeting of the Working Party on the Physical Protection of Books and Documents

Copenhagen, May 21-22, 1971

The Working Party, convened by the International Council on Archives and consisting of six members* seeks to enhance co-operation at the international level between organizations and institutions concerned with the physical protection of books and documents. Its deliberations have culminated in the following conclusions and recommendations.

1. That the below mentioned organizations and institutions, specifically, be invited to join in these co-operative efforts:
   - International Center for the Preservation of Books and Documents, Florence (Florence Center);
   - International Center for the Study of the Preservation and the Restoration af Cultural Property;
   - International Council on Archives;
   - International Council on Museums;
   - International Federation of Library Associations;
   - International Institute for Conservation of Historic and Artistic Works;
   - Internationale Arbeitsgemeinschaft der Archiv-, Bibliotheks- und Graphikrestauratoren (IADA);
   - Restaurator, International Journal for the Preservation of Library and Archival Material;
   - United Nations Educational, Scientific and Cultural Organization.

* List of members: Poul A. Christiansen, Librarian, University Library, Scientific and Medical Dept., Copenhagen (Restaurator); Klaus Desbarats, Conservator, Stadtarchiv Freiburg, Freiburg i. Br. (IADA); Charles Kecskeméti, Archivist, Executive Secretary of the International Council on Archives (ICA); Preben Kirkegaard, Rector, Library School, Copenhagen (IFLA); Ove K. Nordstrand, Conservator, Royal Library, Copenhagen (Florence Center); Morris Rieger, Archivist, National Archives and Records Service, Washington. – The first two sessions were also attended by Giovanni Antonelli, Direzione Generale degli Archivi di Stato, Roma, and Jan Maclean, Archivist, Australia.

2. That, as a preparatory measure, the International Council on Archives establish within its own structure a permanent committee on physical preservation and restoration, one of whose functions would be to maintain external liaison.

3. That the competence of the International Federation of Library Associations' Committee on Rare Books and Documents be extended to include the area of physical protection.

4. That a joint standing group representing the organizations and institutions listed in Recommendation No. 1 above be established to serve the following purposes:

(a) to develop a basic policy and program with respect to international co-operation in the field of physical protection of books and documents;
(b) to co-ordinate the efforts made in this field by the individual organizations and institutions – particularly in connection with research and training – in order to ensure the most efficient use of the available resources and to prevent overlapping;
(c) to assist in the procurement of the necessary financing for key projects.

As a rule each participating organization or institution would be limited to one representative on the standing group. If compelling reasons exist, an additional member may be designated.

5. Among the major matters with which the standing group should give its early consideration are the following:

(a) The need for the International Institute for Conservation of Historic and Artistic Works to focus increased attention on the problems of the protection of books and documents;
(b) The importance of establishing machinery for the diffusion of information and documentation to restoration technicians on an international basis;
(c) The increasing need for the elaboration of programs of multilateral and bilateral technical assistance and economic support in the field of physical protection of books and documents.

6. With respect to technical assistance in this field the Working Party considers that, at the present stage, the following general tasks are particularly urgent:

(a) the conception of specific guiding policies and procedures;
(b) the organization of training organs;
(c) the development of standards.

7. The Working Party makes the following specific recommendations with respect to technical assistance:

(a) that UNESCO consider the needs of protection of books and documents in its planning of library and archival development projects;
(b) that the Florence Center extend its training program to include the training of instructors in preservation and restoration techniques, and that associated training centers be established in the developing regions of the world to provide basic training in these techniques, reserving advanced training to the Center itself;
(c) that, in accordance with the recommendation of the Dakar Regional Archival Seminar held on March 15–April 9, 1971, under the auspices of UNESCO, a study be made to establish standards for library and archive depository structures to assure the maximum protection of books and documents at minimum cost. The study should take into account the needs of different regions and climates and the limitations imposed by economic conditions.

8. It is requested that the International Council on Archives undertake a survey of the world's major restoration laboratories, workshops and training courses, and of all organizations and institutions – international, regional, and national – active in the field of physical protection of books and documents.

It is the intention of the Working Party to meet again, after the various organizations and institutions listed in Recommendation No. 1 above have agreed to participate in the proposed standing group, to prepare a working document as the basis for its initial deliberations. In any case it will meet again not later than May 1972.

The Secretariat of the Working Party will be assumed temporarily by Messrs Christiansen and Nordstrand in Copenhagen pending the establishment of the Florence Center secretariat as on about January 1972.

Poul A. Christiansen
Copenhagen

Obituary Notices

Verner W. Clapp 1901–1972

Verner W. Clapp, Associate Editor to Restaurator, died June 15th 1972.

His half-century of serving the library world began with summer employment at the Library of Congress in June 1922. After graduate work at Harvard University 1922–23 he returned to the institution that was to be his working home for 33 years. At the Library he held different positions: He served as a reference librarian; and when the Library's Congressional Unit was organized to provide special services for Members of Congress, he became its first head; from 1931 to 1937 he was Special Assistant to the Superintendent of the Reading Rooms; from 1937 to 1940 he was Assistant Superintendent to that department and also supervisor of the work of the Division of the Blind. When the Library was reorganized in four departments in 1940 he served as the first Director of the Administrative Department to 1943 and modernized in that period the institution's fiscal procedures.

At the beginning of American participation in World War II it was Mr. Clapp who executed the evacuation and preservation at Fort Knox, Kentucky, of the Nation's most priceless documents including the Declaration of Independence, the Constitution of the United States, and the Articles of Confederation. The Lincoln Cathedral copy of Magna Carta, sent to United States for safekeeping at the outbreak of the war, joined these documents which for all of us express the will to independence and democracy within the Anglo-American world.

In 1943 Mr. Clapp was appointed first Director of the Acquisitions Department and changed the emphasis in book acquisition from subject to area opening new channels to the world's book trade. 1947 he became Chief Assistant Librarian of Congress, serving in that capacity until his retirement in 1956 to accept the presidency of the new established Council on Library Resources. From this post he retired in 1967 and became a fulltime consultant to the Council in the last five years of his life.

Upon his retirement from the Library of Congress the staff gave a party in his honour with the creation of the *Verner W. Clapp Publication Fund* to issue, notably, facsimiles of historic and rare materials in the Collections – in salute to his enduring interest in sharing the Library's treasures and his devotion to great printing.

More could have been added to the list of Mr. Clapp's activities. His services on numerous boards and commissions, his helpful correspondence to librarians around the world, etc.

This external summary shows us the life of a great Librarian. – Once it has been said that the fame of a great man ought always to be estimated by the means used to acquire it. I never met him personnally but from our correspondence I know him very well I believe. It is my impression that the life of Mr. Clapp represents a seldom and happy combination of a man's ability and his possibilities of applying it.

It is known to the readers of this journal that Mr. Clapp was one of the persons who helped to stimulate the research that led to the development of a permanent/durable paper. To me it is symbolic that the last efforts of a man sincerely and successfully interested in librarianship were dedicated to the important work on *The Story of Permanent/Durable Book-Paper, 1115–1970*, published as a three-part article in Scholarly Publishing, 1971. His work will be published in a slightly revised form as a Supplement to Restaurator. This contribution will leave a tremendous impression to his memory.

Poul A. Christiansen
Copenhagen

John Baron Corderoy 1909–1971

Following a long period of ill-health John Baron Corderoy died at his home on December 12th 1971.

John Corderoy was the Senior Lecturer in charge of Bookbinding classes at Camberwell School of Art and Crafts where he had been a member of the full-time teaching staff since 1953. He developed classes in fine hand bookbinding, book restoration and more recently was responsible for the introduction of the full-time course in Archive Preservation and Repair. This course was the first to offer instruction in all aspects of paper conservation and thereby reduce the shortage of trained restorers. Its success will provide a permanent memorial to John who gave many years of his life to the research needed before the course could be offered for approval.

John Corderoy began his career as an apprentice bookbinder with W. H. Smith & Sons with whom he stayed until service in the Royal Air Force in the 1939–1945 war. After the war he accepted a post as part-time lecturer

at Epsom and at Brighton Colleges of Art. During this time he taught on the Librarian and Art Teachers Certificate courses.

In 1965 he wrote »Bookbinding for Beginners« which has since been reprinted in several languages and has become a standard work for those completely new to bookbinding.

In 1967 John Corderoy joined the British Restoration team, as one of its original members, who worked in Florence following the flood disaster. During his many subsequent visits he assisted in the planning and equipping of the Restoration System of the Biblioteca Nationale di Firenze.

To all his work John Corderoy brought those qualities of craftmanship which are greatly admired. He was unable to compromise his skill yet was tolerant of the learner. He will always be remembered with affection by his colleagues and many many students, all of whom considered him a friend.

Robert C. Akers
London

Book Review

MASSENRESTAURIERUNG

Protokoll einer Arbeitstagung im Staatsarchiv Bückeburg vom 17.–18. Februar 1970. Bearbeitet von Brigitte Poschmann. – Veröffentlichungen der Niedersächsischen Archivverwaltung Heft 30. Göttingen: Vandenhoeck & Ruprecht, 1971. 74 pp. Brosch. DM 12.50.

Reviewed by: A. E. Werner, Keeper
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Great Britain

This publication records the proceedings of a conference that was held in the State Archives at Buckeburg on 17th–18th February, 1970, to discuss the particular conservation problems that have arisen in connection with the mass restoration (»Massenrestaurierung«) of large quantities of archives and library material that have suffered damage as the result of flooding. At this meeting, the first of its kind to be held in Europe, lectures were given describing the results achieved during the past ten years in carrying out bulk restoration in different archival workshops.

In the first lecture Johann Hofmann describes the organisation and methods of mass restoration carried out at the State Archives of Lower Saxony in Bückeburg. Of particular interest is the division of the work into four sections, namely, cleaning, resizing, repair of minor damage, and lamination by hand or by machine, and the fact that the personnel is changed every three weeks from one section to another, thus avoiding monotony and ensuring that the workers have the opportunity to develop their skills in different aspects of the conservation work. As regards the methods used, methyl cellulose (Tylose MH 200K of the Firma Kalle) is regarded as the most suitable material for resizing and lamination is carried out using polyethylene film in a heat-sealing press at 120° C. In this connection, Hofmann states that the temperature involved is considerably lower than that used in the Barrow process of lamination. This comparison is, however, not really meaningful; although the temperature on the Barrow process is indeed about 30 degrees higher, it must be realised that in the Barrow laminator a single document is only exposed to a high temperature for 10 *seconds,* whereas in the heat-sealing press a high temperature must be maintained for a period of either 3 or 4 *minutes,* depending upon

the number of leaves that are being laminated in one operation. This longer exposure to a high temperature should be taken into account as a factor of potential damage to paper; indeed Hofmann does mention that the brown colour of water-damaged paper becomes darker in his process of lamination. In the discussion on lamination following this lecture Arad states that in laminators using rollers (e. g. the Barrow, Arbee and Masino-Impex laminators) air bubbles are formed and that only films with adhesive layers can be used This is certainly not in accord with practical experience; air bubbles can always be eliminated and any form of laminating film can be used, if the temperature is adjusted as required. Arad also states that experiments carried out in the Textile Institute in Jerusalem have shown that paper is unaffected by heating at 120° C. for up to three hours. This may well be the case for acid-free paper, but the important question is what happens to paper which contains acid impurities – the effects of which on paper are accelerated by increase in temperature.

The methods of bulk restoration of water-damaged documents being carried out in various European centres are described by A. Arad and Joseph Ries. It is of interest to note the logical approach taken by Arad in his definition of mass restoration, and one would readily agree with his concept that the term is relative and depends on type and amount of material, amount of damage and available facilities. Ries describes in some detail the paper pulp method of repair *(Anfaserungstechnik)* as practised at the Bulgarian National Library »Cyrill and Methodius« in Sofia. This technique is clearly one that affords many advantages in the domain of mass restoration, whereby a mechanical process replaces the time-consuming manual operation of repairing numerous holes and tears in documents. Incidentally, different types of equipment for using this technique were demonstrated in Vienna at last year's meeting of the *Internationale Arbeitsgemeinschaft der Archiv – Bibliotheks – und Graphikrestauratoren* and aroused considerable interest.

The concept of what is involved in the mass restoration of archival material was also discussed by Lola Hasznos in her lecture on cleaning, disinfecting and deacidification as a combined process in mass restoration; she describes in detail the system that has been evolved in her institution during the past thirteen years. It is clear that Frau Hasznos has given a considerable amount of thought to the problems involved in mass restoration; the result is that she has developed a thoroughly sound procedure which is not only based on scientific principles, but also affords an eminently practical solution to the problems involved. Furthermore one

must commend the criteria that she puts forward as being essential for anyone who has the ambition to be a good director of a workshop devoted to the mass restoration of archives; they represent the true spirit of modern scientific conservation.

In conjunction with Frau Hasznos's contribution Peder Pedersen takes into account the economic aspects of mass restoration, and describes the ways and means that have been used at the National Archives in Copenhagen to cope with the problems of deacidifying and disinfecting water-damaged documents when financial means are limited. It was of interest to learn that, using the non-aqueous method of deacidification developed by Baynes-Cope (see *Restaurator* Vol. 1 pp. 2–9 1969), it was possible for one person to treat about 500 sheets in a 7-hour working day.

Finally there are two contributions dealing with the chemical and physical properties of materials used in archival restoration; the first is by Dr. Johannes Friedrichsen and is concerned with the properties and uses of plastic films in lamination, and in the second Günther Lindemann discusses the uses of different grades of methylcellulose and carboxymethylcellulose as adhesives and sizes in the repair of documents. Both these contributions are notable for the extremely lucid manner in which the chemical factors involved are described, and a coherent picture is given of the chemical and physical properties of these synthetic materials as regards their uses in archival restoration. It is of interest to note that Dr. Friedrichsen considers that the most suitable plastic film for lamination is a self-adhesive polyacrylate film manufactured under the tradename »Prelahaut« by the Firma Henkel of Düsseldorf. This suggestion meets with some objections in the discussions following upon these contributions. Incidentally, a particularly valuable feature of this publication is the section devoted to the discussion of the lectures; here many questions of practical importance are brought forward which indicate the lines along which further work must be done in an attempt to solve the peculiarly difficult problems that arise in developing reliable methods for the mass restoration of archives and library material. This is in every way an excellent publication and Frau Dr. Poschmann is to be congratulated on the manner in which the proceedings of this conference have been presented. There is no doubt that it will, as she says in her preface, act as a stimulus for international cooperation in future research.

News and Activities

Library of Congress Appoints Peter Waters as Restoration Officer

The Librarian of Congress has announced the appointment to the Library staff of Peter Waters, the internationally known British book conservator, restorer, and bookbinder. Mr. Waters, who will be the Library's Restoration Officer, joined the staff of the Assistant Director for Preservation on April 12, 1971.

Mr. Waters began studies in graphic design, lettering, and bookbinding at the Royal College of Art, South Kensington, London in 1949, and was awarded the Silver Medal of an Associate of the Royal College of Art upon his graduation in 1953. He then pursued further studies at the Guildford College of Art in Surrey.

Mr. Waters taught bookbinding and lettering techniques at the Farnham School of Art, Surrey, and later was a tutor in bookbinding at his alma mater, where he also served on the Lion and Unicorn Press book team.

Mr. Waters is perhaps best known for his outstanding contributions to the fields of book restoration and library materials preservation, following natural disasters which occured in two major European centers of culture in the late 1960's. Acting as Technical Director, Mr. Waters devised a system for the repair and restoration of thousands of priceless library treasures, including the famed Magliabechi collection, which were damaged by floods which swept through the Biblioteca Nazionale Centrale, Florence, in November 1966. He supervised some 120 persons working in the book restoration center established as an integral part of the Florence national library branch. Following floods in 1967, the Gulbenkian Foundation Museum Library in Lisbon engaged Mr. Waters as consultant for its restoration efforts. Today, Mr. Waters serves as occasional technical consultant on matters of book restoration to both of these institutions, as well as to the British Museum.

In 1969, Mr. Waters became co-director of a research effort aimed at investigation of some of the many problems involved with library materials preservation. The project, funded by the Council on Library Resources and headquartered at the Imperial College, London, includes investigations of mud and stain removal, deacidification techniques, parchment and vellum repair, and related problems.