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Aug. 1957

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Research Institute
Madras

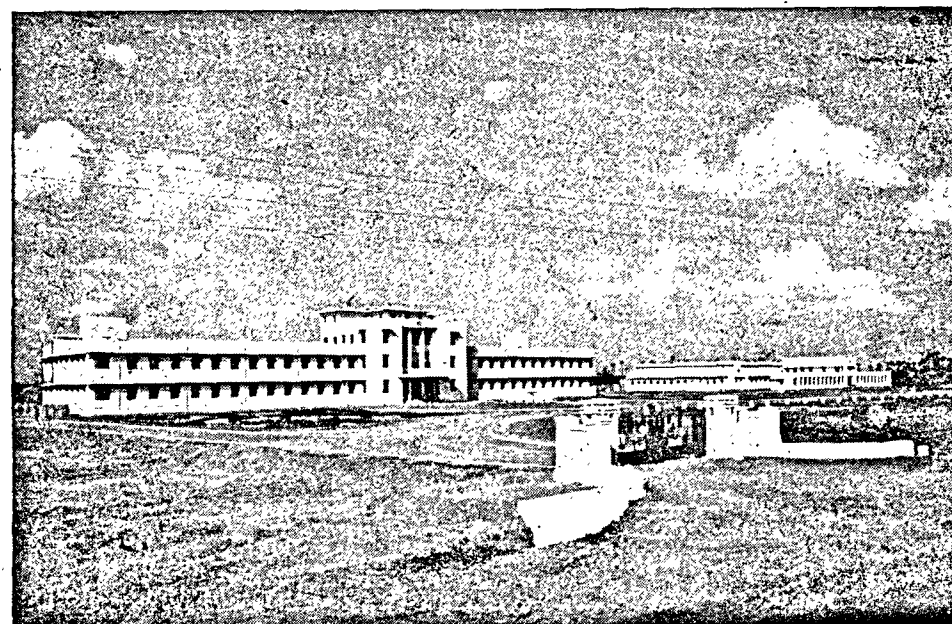


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COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH
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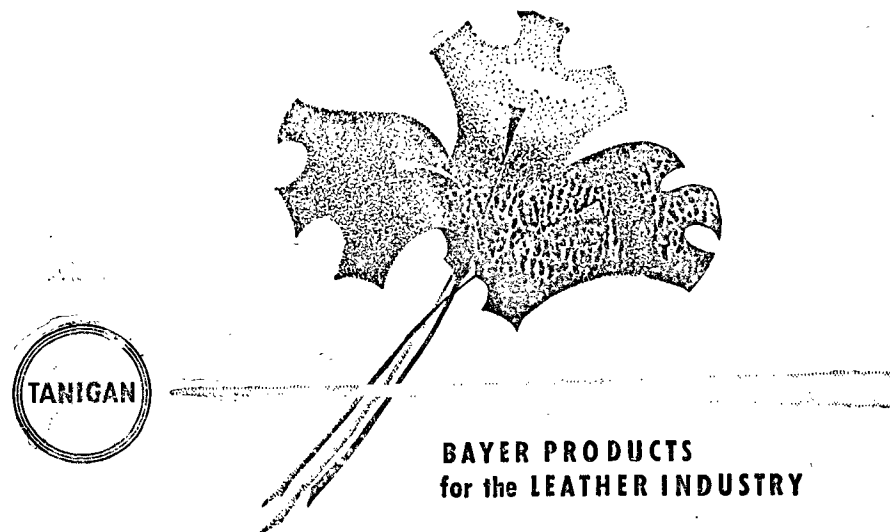
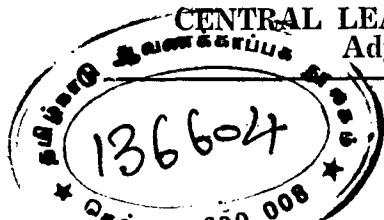
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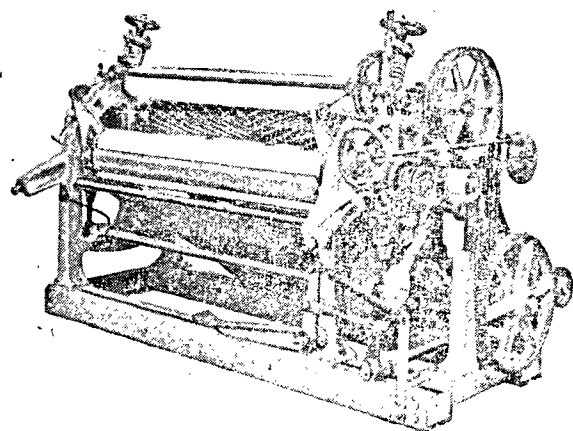
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COMBINATION TANNAGES — PART VI

Combination Chrome Vegetable Tanning in Single Bath*

T. S. RANGANATHAN & Y. NAYUDAMMA

SUMMARY

The leathers tanned with veg-chrome liquors were analysed stratigraphically for the chrome, organic matter and degree of tannage. The dyeing characteristics of these leathers, the physical properties like fulness, thickness, smoothness etc. and the microscopical assessment of these leathers were studied. The results indicate that the tanning with veg-chrome liquors results in leathers superior to those tanned with straight chrome, or vegetable or retanned leathers. The leathers possess both the characteristic properties of chrome as well as vegetable tanning material, together with properties of its own.

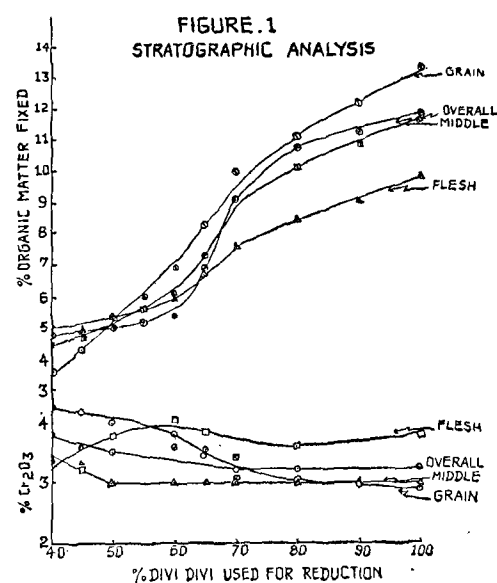
The preparation, the chemical composition and the tanning characteristics of the Veg-Chrome liquors, the optimum conditions for tanning and the effect of concentration, pH and various salts on tanning were discussed in the previous papers.^{1, 2}

Additional information on the chemical characteristics of the leathers produced by tanning with Veg-chrome liquors like the stratographic distribution of chrome, organic matter and degree of tannage; dyeing and finishing characteristics of the leathers, the microscopic and physical properties of the leathers tanned with vegetable-chrome liquors is deemed desirable. A study has been made in this direction and the results are reported in this paper.

Stratographic Study: Pickled pelt pieces (cow hides) of size 9" × 6" were tanned with Veg-chrome liquors giving in all cases the same amount of Cr₂O₃, i.e., 2% on the pickled

*Forms part of the thesis for M.Sc., of the Madras University.

pelt weight. The liquors used were obtained by reducing dichromate with increasing amount of divi-divi. After tanning in the usual manner, the pieces were split in the blue into three layers of equal thickness. Each layer was dried and analysed for chrome content ash, fixed organic matter and degree of tannage by the customary methods of analysis. The results obtained are shown in Figs. 1, 2 and 3.



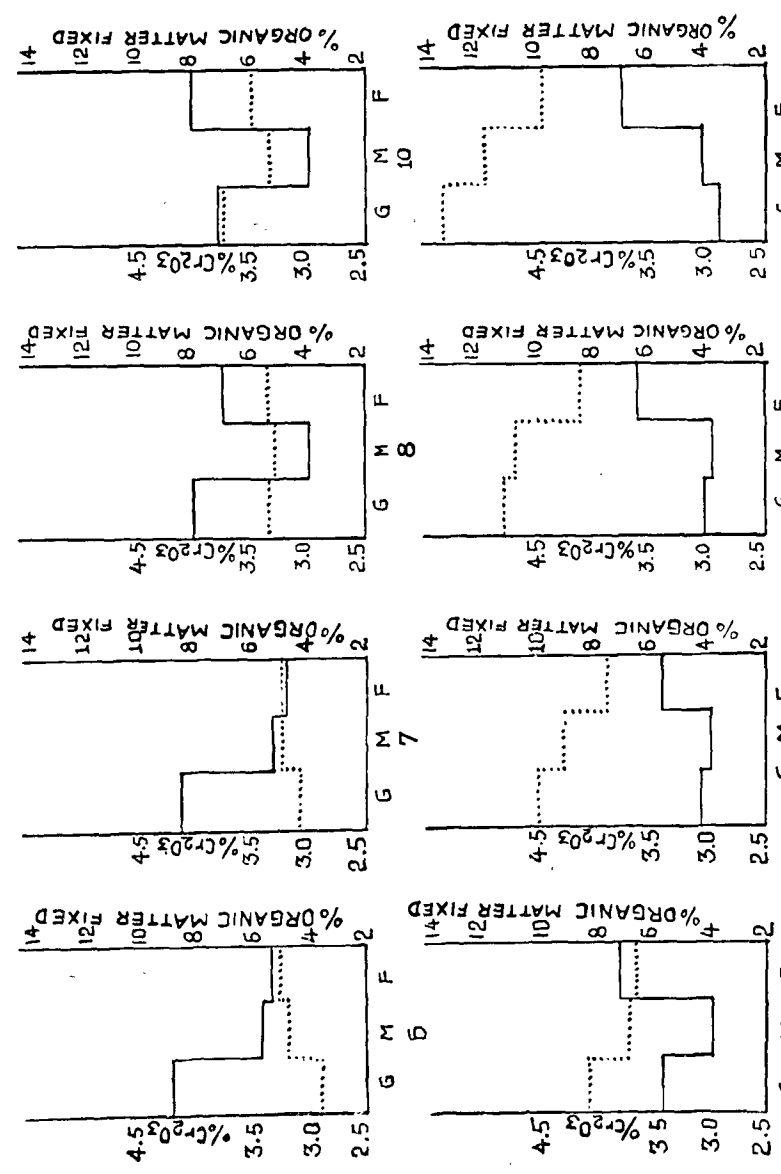
Data and Discussion

Penetration of Tannin: During the course of tanning, it was observed that the chrome complex coloured blue penetrated to the thickness of the pelt first and later followed by the brown coloured free vegetable tanning material.

Chrome Fixation: It is seen from Figs. 1 and 2 that with the increase in the amount of divi-divi used in the reduction of fixed amount of dichromate;

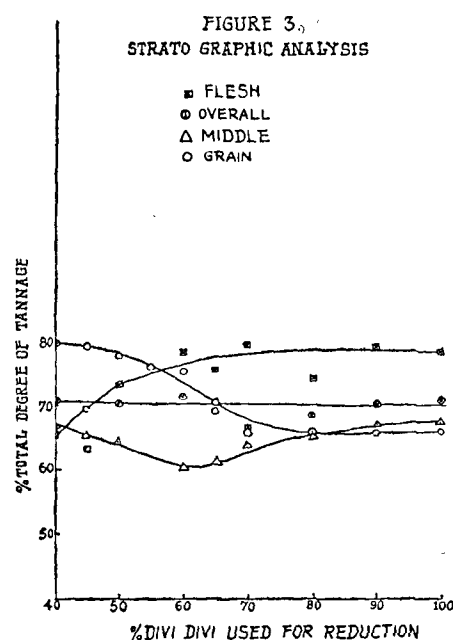
1. Overall amount of Cr. fixed in the total leather is slightly decreased (Fig. 1). This is due to the increase in

FIGURE 2. STRATOGRAPHIC ANALYSIS
G-GRAIN M-MIDDLE F-FLESH ... ORGANIC MATTER



the amount of organic acids and degraded products of divi-divi that may complex with the basic chromium sulphate, further resulting in greater amounts of non-ionic and anionic complexes. The affinity for such liquors to collagen is less as compared to cationic chrome complexes.

2. The amount of chrome fixed in the grain layers gradually decreased; decreased in the beginning but was fairly constant in the middle layers; increased upto a certain extent and later remained constant in the flesh layers. This may probably be due to the increase in the size of the tanning complex with the increase in the divi-divi used for reduction. Flesh layers are more porous than grain layers accounting for the variation in the fixation of Cr.



3. When more than 70% of divi-divi is used for reduction, the distribution of chrome is more uniform and even in the grain and middle layers as seen in Fig. 2.

Fixed Organic Matter: The organic matter fixed in the leather tanned with veg-chrome liquors is contributed by

organic matter present in the tan-liquor in the free form as well as that bound within the chrome complex.

From Fig. 1, it is seen that with the increase in the amount of divi-divi used for reduction:

1. There is an increase in the amount of fixed organic matter which is expected.

2. In spite of a slight gradual decrease in the chrome content, there is an increase in the fixed organic matter which is due to the excess free vegetable material present in the liquor.

3. A sharp increase in the curves (Fig. 1) is observed where more than 70% divi-divi was used on the weight of dichromate for reduction. This may indicate that upto 70% divi-divi, most of the vegetable matter may be bound within the chrome complex, more and more amounts of vegetable matters complexing with chrome, leaving very little free organic matter, that accounting for the increase in fixed organic matter, in spite of the decrease in the chrome content.

Above 70%, a considerable amount of free organic matter may be left behind which may directly react with the protein.

4. The fixed organic matter is fairly uniform in all the layers upto a point (70% divi-divi used). Above this point, the amount fixed is greater in grain, middle and flesh layers in that order. In this region, the fixation of organic matter is in the reverse order to chrome.

Overall Degree of Tannage: This figure is calculated as follows:

Degree of tannage due to chrome (i.e., % chrome $\times 2.73 \times 6.66$) + Degree of tannage due to fixed organic matter.

From Fig. 3 it is seen that with the increase in the amount of divi-divi used for reduction:

1. The overall degree of tannage remained the same. This is a remarkable observation in tanning with veg-chrome liquors. The degree of tannage remains constant; only the proportion of tannage due to the individual tanning agent chrome and veg. may vary.

2. The degree of tannage curves for individual curves, i.e., grain, flesh and middle very closely resemble those for chrome fixation as shown in Fig. 1. This indicates that the tanning is obtained mainly by the chrome-veg. complex and not by the individual chrome or vegetable tanning agents.

Dye Fixation

In order to find the behaviour of the hide powders tanned with the different veg-chrome liquors prepared towards different dyes, experiments were carried out using pure acidic and basic dyes. The dyes used were Acid Fuchsin and basic Fuchsin.

Procedure: An amount of tanned powders equivalent to 1 gm. of the dry powder was taken in dry beakers and the solution containing 15% of the dye on the dry weight was pipetted into the beakers, keeping the total volume of water constant. These were left for 48 hours with occasional stirring. After this period, the solution was filtered and the filtrate and washings were made up in a standard flask. The percentage transmission of these solutions was determined in a photo-electric colorimeter (Craftsman Balance Cell) using filters No. B₁ and G.

Generally acid or direct dyes are used for dyeing chrome leathers, as these have an affinity for such leathers, carrying a positive charge and basic dyes have got a great affinity for vegetable tanned leathers, carrying a negative

charge. From the results, it is seen even when the vegetable tanning material content is increased, the amount of acid dye taken up is almost the same, thus showing that

TABLE 1

Acid Fuchsin

Divi-divi used per 100 gm. bichromate.	Optical density.	% Transmittance.
40	0.208	62.0
50	0.210	61.7
60	0.208	62.0
65	0.209	62.0
80	0.208	62.0
100	0.204	62.2

Basic Fuchsin

40	1.170	5.78
50	1.120	6.22
60	1.105	6.60
65	1.100	6.80
80	1.090	7.30
100	1.060	7.80

the acid fixing groups, i.e., amino groups of the hide powder are still available for the acid dye. Also the vegetable tanning material fixed should be either within the chrome complex or combined with the hide powder, not evidently at the amino groups. The depth of the colour in the powder which was found to increase might be due to the vegetable tanning material present. It has also been observed that while dyeing such leathers, the dye penetrates into the leather very quickly, when compared with the simple

chrome tanned leathers. This property will be very useful when suede leathers are to be dyed, as thorough penetration is essential for such leathers.

While dyeing with basic dyes, it has been observed that the uptake is increased when more vegetable tanning material is present in the tanned powders. It has been pointed out above that the charge of the leathers is not much affected by the increase in the vegetable tanning material content. Therefore, only the same amount of fixation should be expected in all cases. But the increase in the uptake can be explained as follows: Since the chrome content of the leathers is decreased when more of vegetable tanning material is used in the reduction, more COOH groups are available for fixation of basic dyes. The increase can also be due to the vegetable tanning matter, because it has got a capacity to fix basic dyes. In the case of the basic dyes also, the increase in the depth of colour is due to the influence of the fixed organic matter.

Microscopic Study: With a view to find out the structural changes that take place when tanning with veg.chrome liquors, containing increasing amounts of the vegetable tanning materials, the leathers tanned with these were examined under a microscope. The tanning procedure is as follows: A piece of pickled pelt was cut from the exact butt of the cow hide and then split to uniform thickness. This was cut into small strips parallel to the back-bone, so that all the strips would be representative samples for comparison purposes. The tanning procedure was the same as for hide powder tanning. The tanned pieces were washed well and dried. Sections of these pieces were taken for the microscopical examination.

Observations: With the increase in the amount of divi-divi used for reduction, the angle of weave was found to increase from medium to medium high, as also the fulness

of fibre bundles, deposition of colouring matter and the thickness of the grain layer.

Leathers of high chrome content have been shown to be characterised by low fulness of fibre bundles.³ It was noted from the photomicrographs that fulness of fibre bundles increases when more of divi-divi is used in the reductions. According to the above statement, the chrome content should decrease with increase of fulness, which fact has been clearly shown in the data for Cr₂O₃ content of the tanned hide powders.²

It has been shown from the data obtained in the stratigraphic analysis of the leathers that, when the vegetable tanning material content increases in the liquors, more organic matter is fixed on the grain layer and less Cr₂O₃. This greater fixation of vegetable material will result in increase in the thickness of the grain layer, since it has got a filling action which is shown in the microscopical assessment.

When the angle of weave is increased, naturally the thickness of the leather should also increase. This increase in thickness has been verified (see below). The tightness also should be more, since more of vegetable filling material is fixed on the grain, as the divi-divi used for reduction is more, and also because of increase in the angle of weave.

The production of leathers with fine and tight nap can be attributed to the angle of weave. When the angle of weave is low, i.e., parallel to the grain surface, the flesh side will be wooly in nature. But when it is more, the fibres get closer to one another, resulting in the tight nap. Therefore, when more divi-divi is used the angle of weave goes up, resulting in the production of finer and tighter nap.

Physical Properties of leathers tanned with Veg-chrome Liquors: Leathers were produced by tanning with the

liquors prepared, from the same pickled cow hide butt, giving the same percentage of Cr_2O_3 , on pickled weight. The tanned pieces were washed, neutralised with 1% bicarbonate, washed well and fatliquored with 2% Cremol F and $\frac{1}{4}\%$ alum oil. After fatliquoring, the pieces were piled overnight, sammed, set and allowed to dry. The dried pieces were conditioned in moist saw dust, staked and nailed on boards. The pieces were then buffed and trimmed for examination.

With the increase in the amount of divi-divi used for reduction, the following properties are observed:

i. *Fulness*: As the vegetable organic matter content increases, the fulness goes on improving, the leather tanned with liquor No. 10 having extremely good fulness.

ii. *Thickness*: For this, separate pieces were tanned. Before tanning, the pieces were split to a uniform thickness of 2 mm. The thickness after finishing is as follows:

Liq. No.	1	2	3	4	5	6	7	8	9	10
Thickness mm.	2.00	2.30	2.35	2.40	2.45	2.5	2.55	2.60	2.60	2.65

It will be noted that the thickness has been increased considerably.

iii. *Smoothness*: This is not affected.

iv. *General feel and appearance*: Improved with more and more vegetable tanning material.

v. *Colour*: The leather tanned with liquor No. 1 appeared just like any other chrome tanned leather. As the vegetable tanning material content goes up, the colour of the leather changed from blue to light brown and to brown, like vegetable tanned leather.

vi. *Stretch*: Becomes less with increasing amount of divi-divi.

vii. *Nap*: Becomes finer and tighter, as the organic matter content in the liquors increases.

viii. *Tightness and grain*: Increases.

ix. *Crackiness of grain*: The pieces do not crack even on double folding.

x. *Key test*: All the pieces stand this test.

xi. *Tear strength*: High in all cases.

xii. *Shrinkage temperature*: This is found to increase.

The use of aromatic compounds along with chrome liquors has been found to increase the filling action of the liquors.⁴ In the veg-chrome liquors also, the amount of such compounds increases when more divi-divi is used for the reduction. Therefore, this results in increasing fulness, tightness, nap, etc. The same is responsible for the increase in substance also. This kind of single bath chrome and vegetable tanning produces leathers which resemble in most of the properties the chrome-retanned leathers. But chrome-retannage somewhat roughens the grain and also the grain cracks on double folding. Therefore, this process is superior to the chrome-retanning since it produces smooth and noncracky leathers, retaining at the same time, the desirable properties of chrome-retanned leathers.

Acknowledgement

These papers, parts IV, V and VI forms part of the thesis towards M.Sc. Degree of the Madras University of one of us (Shri T. S. Ranganathan). Our thanks are due to the University of Madras for permitting us to publish this series of papers.

Our thanks are due to the Microscopy Section for the Microscopical assessment of leathers.

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4. Immendorfer Collegium, 689, 1937.

A NEW TECHNIQUE FOR THE DETECTION OF DAMAGED SHEEP-WOOL

S. K. MITRA

Sheep-wool is one of the most important of the textile fibres. The bulk of the wool of commerce is obtained in the form of fleece and skin wools. Skin wools are collected from dead sheep by means of depilatories or by sweating process. They may have the cuticle scales damaged by

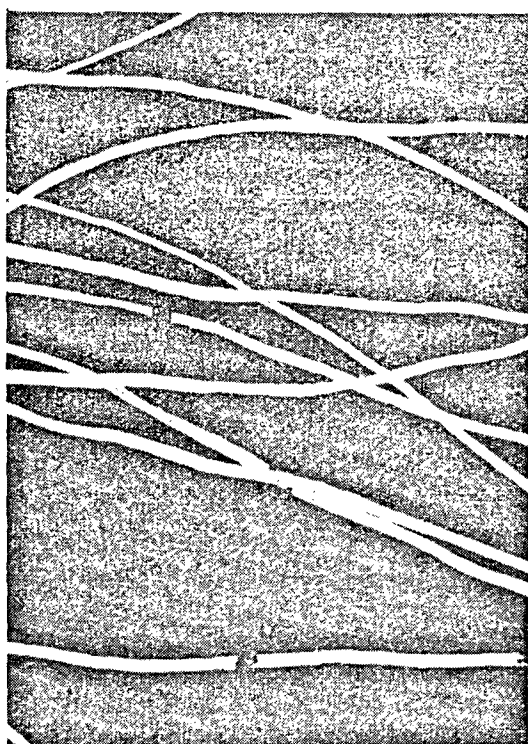


Plate 1: Undamaged wool

the chemical action of the depilatories used or by the bacterial action in the sweat pits. Fleece wools are obtained

from living sheep and are usually received "in the grease", that is unwashed and with all the grease, dirt, etc., present. They are therefore treated with alkaline liquors and scoured in the machine. The qualities of the wool fibres may be seriously injured due to the removal of the cuticle scales by injudicious treatment in the above process. Further, a considerable weight of wool is now chlorinated. Treatment with hypochlorite solutions has the effect of partially removing the cuticle scales, and of rendering the wool less liable



Plate 2: Damaged wool

to felting. Over-chlorination removes the cuticle scales entirely, rendering the wool worthless. The detection and estimation of these damages to wool fibres are very important to determine and assess the quality of the raw wool, but have been hard to estimate quantitatively; and a method

was sought for. A very simple and quick method has now been developed by which damaged sheep-wool (white variety only) can be detected and estimated in 15 to 20 minutes by microscopical technique. The method is as follows:

The sample of the wool to be examined is soaked for 5 minutes in Lactophenol cotton blue solution prepared by dissolving 0.05 grms. cotton blue in 10 cc. distilled water and 20 c.c. glycerine, and adding 10 gms. Phenol and 10 c.c. Lactic acid to it. The treated wools are then washed in 2 to 3 changes of water to remove the adhering cotton blue solution and dried by pressing lightly between two pieces of filter papers. Lactophenol cotton blue stains the damaged wool fibres in which the cuticle scales have been removed or damaged especially by the action of alkali in the washing and scouring operation. The wools are then placed on the stage of a stereoscopic microscope fitted with 2x objectives and 8x eyepieces, and examined by reflected light using a pointolite lamp as the source of illumination. Damaged wool fibres appear dark blue whereas undamaged wools appear either white or slightly bluish-white. 200 wools are then counted from different fields under the microscope noting the number of damaged and undamaged wools, and the percentage of damaged and partly damaged wools is determined. The technique presented requires only 15 to 20 minutes in all, and appears to be a promising tool for the determination of the percentage damage in a consignment of raw wool. The staining effect has been demonstrated in the photomicrographs.

Thanks are due to Dr. Y. Nayudamma, Assistant Director-in-charge, Central Leather Research Institute, for permission to publish this technique.

Microscopical Laboratory,
Dated 2-1-57.

TECHNICAL SEMINARS

Some Leather Defects due to Animal Diseases*

R. BHASKARAN

The different ways by which the diseases that affect the living animal affect the leather industry were described from the following points of view, viz. (i) Animal diseases communicable to man through the agency of hides and skins, (ii) Diseases that might be carried through hides and skins to disease free countries and (iii) diseases that affect the value of leather produced.

The damages caused by insect pests were demonstrated along with the pests causing the damage with a description of the method by which such damages were caused. The talk was illustrated by micro-projections, lantern slides and leather samples showing such defects.

*Summary of the paper read at Seminar held on 31st May, 1957.

The Grain Pattern of Hides and Skins†

S. K. MITRA

The grain pattern which determines the outward character of the final leather, and provides an easy means of identifying different types of leather, varies not only with the species of the animal but also over the area of the same hide or skin. The design on the outer surface of the finished leather produced by the arrangement of hair follicles is distinct for each species of animal and each pattern is a

†Summary of the Seminar talk delivered on 12-7-57.

composite of the openings of hair pores, presence or absence of nerve Papillae and the cumulative effects of the structures underlying the surface. The normal design of the surface pattern in a hide or skin is influenced by a number of factors including depth, diameter, direction and inclination of hair follicles, number of hairs per unit area, parity and disparity in hair pores, development of nerve papillae etc. The conditions which influence the character of the grain pattern indirectly are: thickness of the papillary layer, number of sudoriferous and sebaceous glands per unit area of the hide or skin, localised growth of elastin forming grain indentation, contracted hair muscle etc. A relatively thicker papillary layer in the case of calf skin partly for its finer feel of the grain pattern, and one of the reasons of very rough pattern in buffalo hide is its sparse hairs with much developed nerve papillae. The naturally coarse pattern in sheep skin is partly due to its thicker and longer hair follicles with high inclination and partly to the sponginess of the papillary layer. The natural coarseness in the case of goat skin is modified to a great extent by low inclination of the hair follicles and a relatively more compact papillary layer.

Of the abnormal conditions which affect the nature of the grain pattern are various diseases especially the nutritional one. Cockle is an example of nutritional disease which occurs as rounded nodules in the corium making the grain pattern coarse. The complexity of the grain pattern and its natural variation over the entire area of the same hide or skin make it very difficult to produce leather with uniform grain pattern all over. A biological survey of Indian hides and skins from leather making point of view has been undertaken at the Microscopical section of the Central Leather Research Institute to study the histological variations due to different places of origin and micro-tannological effects during processing.

CLASSIFIED ABSTRACTS

THE ANALYSIS OF CURED HIDES FOR LEATHER MAKING SUBSTANCE. R. M. Lollar. *Via. Shoe and Leather Repr.* 286, 6, 20 (1957).—(Paper presented at Leather Chemists Convention). The unique characteristically high content of the amino acid, hydroxyproline, in collagen and the method of assay for this amino acid developed by Neuman and Logen, suggested an assay method for the content of "leather making substance" in cured cattle hides. This paper presented information on the precision of the assay method for hydroxyproline, as well as on the recommended hydrolysis procedures to free this amino acid from collagen.

SOME ECONOMIC ASPECTS OF GRUB CONTROL. F. O'Flaherty. *Via. Shoe and Leather Repr.*, 286, 6, 20 (1957).—(Paper presented at Leather Chemists Convention). With the development of truly efficacious treatments for the control and elimination of grub infestation in cattle, there arise many economic problems. These were delineated and discussed with the purpose of stimulating interest in establishing practical use of the newer treatments.

PROCESSES PRIOR TO TANNING

CHEMICAL STUDIES ON THE LIMING OF ANIMAL SKIN. VI. EFFECTS OF ORGANIC NITROGEN COMPOUNDS IN ACCELERATING THE UNHAIRING OF ANIMAL SKINS BY LIME LIQUORS, PART I.—AMINES. H. Toyoda and A. Fukami. *Repts. Gov. Chem. Ind. Research Inst., Tokyo*, 51, 429-36 (1956) (English summary). *Via. J.A.L.C.A.* 52, 5, 284 (1957).

The accelerating action of various amines, in M concentration in lime liquor at 25°C., on the unhairing of goat and cattle hide, was studied by measuring the depilation load (*Lennox. J.A.L.C.A.* 41, 91, 1940). The most active compound studied was diethylamine. Next came dimethylamine, ethylamine and methyl-n-butylamine, Cyclohexylamine, monoacetylenediamine, and N, N-diethylethylenediamine were least effective. Tertiary amines and aromatic amines were without action. The introduction of negative groups, such as acetyl and phenyl groups, into the amine molecule decreases the unhairing power markedly.

THE DEPILATION OF SHEEP-SKINS WITH ACETIC ACID. M. S. Currie, J. B. Moore, and J. S. Chisholm. *New Zealand, J. Sci. Technol.*, **38B**, 19-30 (1956). *Via J. A. L. C. A.*, **52**, 5, 285, (1957).—Diastase was found to have no wool-loosening action, under sterile conditions, in phosphate buffer at pH 6.6 and 37°C Pectinase produced moderate wool loosening in phthalate buffer at pH 4 and 37°C., and very marked loosening under the same conditions in acetate buffer. The discovery that equal loosening took place in the acetate buffer without the enzyme led to a re-examination of dewooling with acids. In small scale experiments, satisfactory wool loosening was obtained with 0.05 M acetic acid, buffer at pH 4 and 37°C., in 16-20 hrs., or by a 45 min. soak in 0.5M acetic acid followed by wringing and storage at 32°C., for 22 hrs. Other organic acids gave some loosening but were less affective than acetic. Tests with ammonia confirmed previous reports that the unhairing action is inadequate for commercial wool pulling, and decreases with time because of excessive swelling. Attempts to loosen the wool with acids at room temperature were unsuccessful. When the procedure that worked well on small pieces was applied to whole skins, patches of tight wool remained. Both the acid-treated pelt and the wool deteriorated on storage, even though the pelt was pickled and the wool was washed.

TANNING

VEGETABLE TANNING

FORMATION OF RESINOUS, GUMMY SUBSTANCES IN SUMAC EXTRACTS BY ALTERATION OF THE NON-TANNINS. A. Yague Gil. *Bol. Asoc. Quim. Espan. Ind. Cuero*, **15**, 35-42 (1954). *Via J.A.L.C.A.* **52**, 6, 352 (1957).—The author makes a careful study of the variations of the composition of sumac extracts obtained and treated under different conditions (aqueous alcohol or water extractions, detannization, etc.). He finds that in an extraction with aqueous alcohol (1:1) the relation T/NT is higher than in a water extraction, with a much smaller amount of sugars and an absence of resins and gallic acid, and also a smaller alteration of the solutions. The nontannins form resinous, gummy substances which are known to be formed from the sugars. Hides tanned with an aqueous alcohol extract were of normal aspect, whereas hides tanned with a water extract, rich in sugars and containing gallic acid, were firm and showed a much darker color.

INFLUENCE OF VARIOUS FACTORS IN THE EXTRACTION OF OAKWOOD TANNERS. M. Zurakowski and W. Wisniewski. *Przegląd Skorzany*, 1954, No. 10, 17: *Polish Tech. Abstr.* 1955, No. 2, 145, *Via J.S.L.T.C.* **41**, 5, 185 (1957). For industrial extraction, the wood should be reduced to pieces of less than 0.5 cm., and for thicker shavings, time or temp. should be increased. The optimum extraction temp. is 97°C, and the maximum extraction time per diffuser should not exceed 2 hr. If pressure extracted, the pressure was satisfactory at between 1-2 atmos., and extract yield decreased at 3 atmos., and a temp. of about 135°C.

CHROME TANNING

INFLUENCE OF TEMPERATURE ON THE REACTION OF A CHROME TANNING SOLUTION WITH CALFSKIN SQUARES. Joseph R. Kanagy. *J.A.L.C.A.*, **52**, 3, 142, (1957). The influence of temperature on chrome tanning is of interest because the data may be used to calculate heats of reaction and to obtain fundamental information on the mechanism of tanning. The procedure used was to soak 2 grams of dry-dehaired, delimed hide in water until fully swollen and then add varying amounts of chromium from a 33½% basic, SO₂-reduced, tanning agent. Determinations of hide substance, chromic oxide, and total sulfate were made on the washed, tanned squares. Under all conditions the amount of chromic oxide (Cr₂O₃) retained at 50°C. was 3 to 4 times greater than that retained at 0°C. Addition of formic acid decreased the amount retained at all temperatures. From the data obtained at different temperatures, it was found that the combined chrome complex had an acidity of about 41%. The amount of protein-bound acid was found to be a constant at about 0.39 milliequivalents per gram of collagen. The effect of increasing temperature on chrome tanning is explained by increased hydrolysis, accelerated by an increase in the ionization constant of water, to form larger chrome complexes.

STUDIES ON THE TANNING PROPERTIES OF CHROME LIQUOR PREPARED FROM ORGANIC REDUCING AGENTS. IV. INFLUENCE OF AGING UPON THE MASKING EFFECT OF VARIOUS ORGANIC ACIDS: Y. Sakimoto and T. Osugi. *Mem. Fac. Agr. Hokkaido Univ.*, **2**, 195-201 (1956) (English summary) *Via J.A.L.C.A.* **52**, 5, 288 (1957). Cr alum solutions were treated with 0.25 and 0.5 mol organic acid (HCOOH, CH₃COOH, (COOH)₂) per mol Cr and aged. Determinations were made of pH, hot and cold basicities, and amounts of HCl reacting

with hydroxo groups of the Cr. complex. On aging, pH values increased in the presence of the organic acids and declined in their absence. Basicity increased in the presence of organic acids, especially oxalic, and was unchanged in their absence. The calculated amounts of acido groups entering the Cr complex declined in the order: oxalate, formate, acetate. The uptake of HCl by hydroxo groups decreased with aging in the presence of 0.25 mol formic and acetic acids, was constant in the absence of organic acids, and increased in the presence of 0.25 mol oxalic acid. In the presence of 0.25 mol oxalic acid. In the presence of 0.5 mol organic acid, the uptake of HCl increased for all the acids, decreasing in the order: oxalic, acetic, formic.

OTHER TANNAGES

TANNING LEATHER WITH ALUMINIUM COMPOUNDS IN COMBINATION WITH CHROMIUM. L. B. Sakin and I. P. Strakov. *Tanner*, 12, 2, 51, (1957). The chromium-alum tanning compounds were prepared in three alternative ways: 1. A mixture of potassium bichromate, alum and sulphuric acid was prepared and glucose was added gradually to reduce. 2. Potassium bichromate, alum $\frac{1}{2}$ mol of sod. formate per atom of aluminium and sulphuric acid further reduced by glucose. 3. 33% basic chromium compound is mixed with aluminium compounds of 20% basicity and the mixture warmed for an hr., in a water bath at 40 to 42°C. In tanning with these combination salts it is observed that the best combination is achieved by mixing aluminium compounds into a solution of potassium bichromate and acid with subsequent reduction of chromium. Better results were obtained when sod. formate is added.

—Y. N.

THE EFFECT OF SALTS IN FORMALDEHYDE TANNAGE. I. Y. Nayudamma, S. K. Jayaraman and T. S. Krishnan—*J.A.L.C.A.* 52, 5, 238 (1957). Collagen pieces were tanned with formaldehyde at pH 7 in the presence of equimolecular quantities of 20 different salts. In general the presence of salt raised the fixation of formaldehyde and the shrink temperature. Three of the more effective salts were used at different concentrations at pH 7, and at constant concentration at pH values from 2 to 11. These salts caused increased fixation at pH values below 3.5 and above 5, and decreased fixation at pH 3.5—5.

UTILISATION OF SULFITE CELLULOSE WASTE LIQUORS AS TANNING MATERIAL. IV. TITRATION CURVES

AND ABSORPTION CURVES OF VARIOUS LIGNIN EXTRACTS. Y. Sakimoto. *Jan. J. Zootech. Sci.*, 26, 145-47 (1955) (English Summary) *Via J.A.L.C.A.* 52, 5, 292 (1957). Titration curves and absorption curves as functions of pH are given for 6 lignosulfonate extracts and compared with those of typical vegetable tannins. The curves for the lignosulfonates appeared to vary with the previous treatment of the extract. V. THE PREFERENTIAL TANNIN ABSORPTION BY HIDE POWDER FROM BLENDED TAN LIQUOR (2). Y. Sakimoto and K. Katayama. *ibid.*, 149-53 (1955) (English summary).—Preferential absorption of one or the other tannin in a binary blend was measured from the gallic acid and ethyl acetate values of the liquors from which part of the tannin had been absorbed by hide powder. Each blend was tasted at its natural pH and at pH 6. The following preferential absorptions are reported. (1) wattle-mangrove, wattle, more at pH 5.8 than at 4.3; (2) quebracho-wattle, quebracho, especially at pH 6; (3) quebracho-mangrove, quebracho, especially at pH 4.1; (4) wattle-lignosulfonate, wattle (slight) at both pH values; (5) quebracho-lignosulfonate quebracho at both pH values; (6) wattle-chestnut, chestnut (slight). VI. PREFERENTIAL TANNIN ABSORPTION FROM BLENDED LIQUORS (3). Y. Sakimoto and K. Katayama, *Bull. Japan. Assoc. Leather Technologist*, 2, 146-51, (1956) (English Summary). Pieces of limed, de-haired, and delimed horsehide were partly tanned with various blends and then retanned with the same blends at 3% concentration for 3 hr., using 500 ml. liquor to 200 g. hide. Each blend was used at its natural pH value and at pH 5.5. Preferential absorption was measured by determining gallic acid values and ethyl acetate values for the spent liquors. The reported results for preferential absorption are: (1) chestnut-wattle, none at pH 3.6-4.6, or 5.5 (2) chestnut-soluble quebracho, chestnut at pH 5.5 but not at 3.7-4.4; (3) chestnut-mangrove, chestnut at pH 5.4 more than at 3.5-4.7; (4) chestnut-Hansa D (lignosulfonate), chestnut at pH 2.7-4.3 and even more at 5.5; (5) wattle-soluble quebracho, wattle at pH 4.5 and 5.3-5.7; (6) wattle-mangrove same as (5); (7) wattle-Hansa D, wattle at pH 3.4-4.6 and 5.5; (8) soluble quebracho-mangrove, quebracho, at pH 4.4-4.6 and much more at 5.3-5.6; (9) soluble quebracho-Hansa D, quebracho at pH 3.6-4.4 and 5.4-5.7. In general, preferential absorption of the natural tannin increases with pH value. Wattle is preferred to chestnut for blending with lignosulfonate.

PROCESS AFTER TANNING

PHYSICAL PROPERTIES OF LEATHER FATLIQUORED AT DIFFERENT OIL LEVELS. *Victor Mattei and William T. Roddy. J.A.L.C.A. 52, 3, 110, (1957).* The physical properties of chrome-tanned leather fatliquored at different oil levels give information that is important in elucidating the fatliquoring mechanism. In the present study the amount of oil taken up by the leather was varied by fatliquoring at different oil levels. The tests used to measure the physical properties were tongue tear, stitch tear, tensile strength, elongation component, needle puncture and hardness. Statistical analyses of the data were made, and the data are presented to show the influence of the amount of oil on the physical properties of the leather. Cross-sections of the leather were prepared and studied to determine the deposition at the different oil levels.

THEORIES

STUDIES ON THE REACTIVE GROUPS OF COLLAGENS II, EFFECT OF THE REACTIVE GROUPS ON THE FIXATION OF CERTAIN ALDEHYDES. *S. M. Bose and K. Thomas Joseph. J.A.L.C.A., 52, 4, 200, (1957).* To obtain information as to the specific reactive groups of collagen that react with aldehydes, the fixation of formaldehyde, acrolein, and crotonaldehyde, by various modified collagens and by a polyamide, has been studied.

HEATS OF WETTING OF MODIFIED COLLAGEN AND OTHER MATERIALS—*Joseph R. Kanagy and James M. Cassel—J.A.L.C.A. 52, 5, 248 (1957).* The integral heats of wetting of modified collagens and other organic materials, including other proteins, plastics, and carbohydrates, were determined. Modifying collagen by treatment with acetic anhydride, methyl alcohol, or nitrous acid reduces the heat of wetting and the amount of moisture adsorbed under controlled conditions.

In general, materials that have a high percentage of hydrophylic groups give the highest heats of wetting. These hydrophylic groups include the free basic and acidic groups on side chains, hydroxyl groups and nonhydrogen-bonded peptide groups. The heat of wetting, is, however, also influenced by crystallinity and the physical state of the material. The basic and acidic groups of proteins attract water more strongly than the hydroxyl groups of carbohydrates. The determination of the heat of wetting offers a convenient procedure for measuring the hydrophilic properties of a material.

TESTING

DIFFERENTIATING TITRATION OF ACID MIXTURES IN ACETONE. *J. S. Fritz and S. S. Yamamura. Anal. Chem., 29, 1079 (1957).* Using a glass-calomel electrode system, phenols, carboxylic acids, enols, imides and sulfonamides were titrated successfully. Acetone was used as solvent and Tetra alkyl Ammonium Hydroxide in benzene-methanol as titrant.

— Y. N.

RAPID QUANTITATIVE DETERMINATION OF HYDROQUINONE. *C. B. Jorden. Anal. Chem., 29, 7, 1097 (1957).* A rapid and accurate method is described for the determination of hydroquinone. Dissolve 1 gm. of hydroquinone in distilled water and make up 500 ml. Titrate a 50 ml. liquor with 4% aq. ferric chloride hexahydrate at a rate of 10 to 12 drops per minute, using a yellow pigment for the titration. Agitate after each addition of a drop till the green colour is no longer found. The pH of the aqueous sample containing the unknown quantity of hydroquinone is adjusted to between 3.5 and 5 by dilute hydrochloric acid or sodium hydroxide, then titrated with ferric chloride solution. Grams of hydroquinone in sample is equal to: ml. of FeCl_3 used in sample titration/ml. of FeCl_3 used in blank titration X Wt. of C.P. Hydroquinone/10.

— Y. N.

FLEXIBILITY GAUGE. *Alfred W. Hopton. J.A.L.C.A., 52, 3, 124, (1957).* A description is given of a simple, rugged, and portable instrument for measuring the flexibility and resiliency characteristics of both light and heavy leathers. The usefulness of the instrument is illustrated by data obtained on a wide variety of leathers.

PROVISIONAL METHODS OF ANALYSIS USED AT THE EXPERIMENTAL STATION FOR THE LEATHER INDUSTRIES OF NAPLES (ITALY), *Cuoio, Pelli, Mat. Concianti, 32, 89-115, 180-215, 271-96, 402-418 (1956) Via J.A.L.C.A. 52, 5, 283, (1957).* Methods for the determination of the following physical and mechanical properties of leather are described in detail: sampling, conditioning, thickness, area, specific gravity (apparent), tensile strength, stretch, tongue tearing strength, split tear, buckle tear, stitch tear, hardness, rigidity, compressibility, abrasion resistance,

resistance of the grain to compression; permeability to air, to water vapor, to water (both at constant and variable pressure); water absorption, heating test, shrinkage temperature, gelatinisation temperature, resistance to rubbing, resistance of the dyes to water (cold and warm) and to artificial perspiration, washing test, filtration test (for chamois leather, aging damage test).

A COLLABORATIVE STUDY ON THE CINCHONINE METHOD FOR DETERMINATION OF LIGNOSULFONATES IN VEGETABLE EXTRACT BLENDS. *Sverre Dahl, and Hohn Mandel. J.A.L.C.A. 52, 4, 184, (1957).* Collaborative analyses were made by six laboratories on 12 samples (one vegetable extract, four commercial lignosulfonate tanning agents, and seven blends of vegetable tanning materials and lignosulfonates). Analyses were done by the cinchonine method previously reported by this committee. The results were subjected to statistical analysis. The committee finds that the method is not sufficiently accurate to be adopted as Provisional Method of ALCA.

DETERMINATION OF THE SULPHATE ION WITH THE COMPLEXONS. *A. Casini Ann. Chimica, 46, 697-702 (1956). Via. J.A.L.C.A., 52, 5, 282 (1957).* (I) Determination in the presence of ammonium or alkaline salts: To 100 ml. of heated solution add an excess (20-40 ml.) of 0.1 M solution of Barium chloride ($\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$), and let a = no. of ml. employed; BaSO_4 precipitates; boil the solution (with the precipitate) for 1-2 min., and after cooling (the solution has pH 4-6), and 3 drops of naphtholphthalein solution (0.1% in 70% ethanol), and titrate without filtering with 0.1 M Complexon, until the colour turns from pink to greenish-blue. The complexon solution is prepared following Schwarzenberg and Biedermann (*Helvetica Chim. Acta, 31, 459, [1948]*): 37.21 g. of Complexon III is dissolved in 1000 ml. of 0.2 M. $\text{NaOH}(\text{CO}_2 \text{ free})$ Solution; keep in polytene bottles to avoid corrosion of glass. Note that the pink colour appears only a few ml. before the colour change to the greenish-blue. Let b = no. of ml. employed in the titration, the result is calculated with the formula: $\text{g. SO}_4 \text{ ion in 100 ml. sample} = 0.0096066 (a - b)$. (II) Determination in the presence of alkaline-earth salts: Make a first titration as indicated above, but without heating and without addition of the barium chloride solution. Let a = no. of ml. of the Complexon solution employed. To another portion of 100 ml. of the solution to be examined add the barium chloride solution (b ml.) boil without filtering, and titrate with Complexon

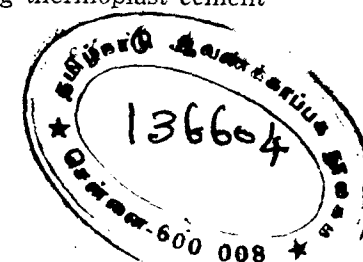
solution as above. Let c = no. of ml. of the Complexon solution employed in this second titration. The result is calculated as follows: $\text{g. SO}_4 \text{ ion in 100 ml. sample} = 0.0096066 (b - c + a)$.

THE FIRMNESS OF LEATHER. *E. Simoncini, Cuoio, Pelli, Mat. Concianti, 32, 390-402 (1956) Via. J.A.L.C.A., 52, 5, 283, (1957).* The firmness or rigidity of leather is defined as the resistance to deformation under the action of external forces, and it is the converse of flexibility; however the various terms of firmness, rigidity and hardness are frequently confused. The determination of rigidity may be made with an apparatus for measuring flexibility, e.g., the Olsen apparatus (cf. MacLaughlin & Theis, *Chemistry of Leather Manufacture, 1954, page 774*), and the rigidity factor is calculated with the formula $F = \frac{M.a.L.}{100 (1.S^3. h)}$ where M = Pendulum mass, L = Length of the arm, a = angle read on the scale of the moments, h = angle of bend, S = thickness of the sample, and l = breadth of the sample. With this apparatus several determinations were made on vegetable and chrome leathers, and it was shown that a previous wetting of the leather samples decreases the rigidity of the chrome leathers, while with the vegetable leathers, the action is not constant.

ESTIMATION OF SULPHITE-CELLULOSE EXTRACT IN SYNTANS. *M. P. Balfe, J.S.L.T.C., 41, 4, 118, (1957).* The cinchonidine precipitation method for determination of sulphite-cellulose extract does not give satisfactory results in the presence of syntans. It is suggested that an approximate measure of the proportion of sulphite-cellulose extract in syntans can be obtained by determination of methoxyl, assuming that the solid matter of sulphite-cellulose extract contains one-seventh of its weight of methoxyl.

FABRICATION AND MACHINERY

REVOLUTIONARY NEW MACHINE UPHOLSTER PANEL IN ONE OPERATION. *The Lea. Manfr., 74, 6, 54 (1957).* One of the greatest boons to the upholstery is a remarkable new machine designed for use in fabricating panels for automotive, aircraft, furniture and luggage industries which is being produced by Kamborian Products, Inc., 292, Main Street, Cambridge, Mass., known as 'Kamborian Edge Folder', the machine stretches material over surface of a form cementing the marginal portion to the reverse side securely in one operation. Using thermoplast cement



which is fed automatically under controlled temperature to the operating head. The Kamborian Edge Folding Machine performs complete upholstering operation as fast as material can be fed by the operation. The advantages of this machine are numerous. Uniform high quality with saving in time and labour are foremost among those listed. Successful pilot studies are being undertaken with automotive and aircraft part manufacturers, particularly in door panel work. Folding and sealing operations are made practically instantaneous by the use of patented knurled feed gears and automatic folding and cementing controls. Fast operation, uniform high quality, elimination of messy precementing operations, combined with savings in material are among the bonus benefits claimed for this machine.

THE EFFECT OF SALT CONCENTRATION ON THE BIO-CHEMICAL REACTION OF SOME HALOPHYLIC BACTERIA. N. E. Gibbons, *Canadian J. Microbiology*, 3, 2, 249 (1957). Tests with a number of stains of halophylic bacteria indicates that biochemical reactions such as protein hydrolysis and indol and hydrogen sulphide production, may vary with the concentration of salt in the medium. It is suggested therefore, that tests should be made with a series of salt concentration giving the range of growth of organisms before the negative results are reported.

— Y. N.

NEW GLUING MATERIALS FOR SHOE MANUFACTURE. B. Y. Kazanovich, *Tanner*, 12, 2, 46 (1957). The glue meant for pasting leather and cardboard counters into uppers in footwear is composed of, latex—19.4, carboxy methylcellulose—1.9; colophony—9.7; benzene—9.7 and water—57.4 parts. The carboxy methylcellulose should swell in water for 4 to 6 hrs., after which it is stirred while being heated on a water bath. The glue, heated to a temp. of 30 to 40°C, is mixed with a solution of carboxy methylcellulose; latex heated to a temp. of 30°C, is then added to the mixture and a 50% solution of colophony in benzene is added. The film of the glue so prepared is applied on uppers is dried for 30 minutes at 50°C, after which the film is coated with acetone or ethylacetate, and the shoes are pressed in for 10 to 15 minutes in the glue.

THE TECHNICAL CHARACTERISTICS OF CHAMOIS LEATHERS FOR CLEANING AND FILTERING PURPOSES, AND PARTICULARLY OF THOSE PRODUCED FROM THE

SKINS OF CHAMOIS (*Rupicapra Europaea* L.), R. Airolidi. *Ann. Chimica*, 45, 517-525 (1955). *Via. J.A.L.C.A.*, 52, 5, 282, (1957). Degrained sheep skins tanned with marine oils are commonly called "Chamois leathers". The most important specifications for these leathers are (values calculated on dry basis): ash max. 5%; fatty matter (extraction with CHCl_3 , or successive extractions with petroleum ether and a mixture of ethanol and ethyl ether) max. 5%; water-soluble matter (at 45°C.) after the fat extraction) max. 1%; pH (2g. leather in 100 ml. H_2O) 3.5-8.0, and max. difference index 0.7 if the pH is less than 4.5; shrinkage temperature min. 60°C.; tensile strength min. 1 kg. per sq. mm. section; stretch min. 40%; water absorption min. 130% in 5 min. and 170% in 30 min. The filtration test is made by filtering gasoline mixed with 5% water through a leather disc of 20 cm. diameter; at least 750 ml. gasoline should pass through the filter before the first drop of water. It was sometimes affirmed that the chamois leather obtained from the skins of the "true" chamois (the antelope) is better than that obtained from the skins of other animals, particularly goat and sheep skins. Approximately 1 million chamois (animals) live in Europe and not more than 50,000 skins yearly are tanned (as chamois leather); generally these skins are very poor, with scars and various alterations. Some experiments were made with skins of chamois, goat and sheep, tanned in the same way with cod-liver oil; the chamois and goat skins absorb oil more slowly than the sheepskins. The leathers were analysed with the standard methods, and the results showed no difference in the three different types. A sure identification of the "true" chamois skin appears to be possible neither by chemical analyses nor by microscopical examination. Taking into account the observed results, the preference for "true" chamois leathers over those obtained from goat or sheep skins is not justified.

THE EVALUATION OF TANNERY WASTES.—Mark M. Luckens. *J.A.L.C.A.*, 52, 5, 260 (1957). Before deciding on any method or process for treating tannery wastes, a survey must be conducted to determine the amount and characteristics of the total effluent and of the portions of the effluent originating in each tannery operation. Of equal importance is a survey of the receiving stream to determine the effect of the effluent on the stream, since the amount and character of treatment required are determined by the difference between the total effluent on the stream, since the amount and character of treatment required are determined by the difference between the total pollutional potential of

the effluent and that which the receiving stream can tolerate without impairment of its over-all value to the community. Methods for conducting such a survey are described.

A STUDY OF THE MECHANISM OF FATTY SPUE FORMATION. I. R. G. Mitton and K. G. A. Pankhurst, *J.S.L.T.C.* **41**, 4, 128, 1957. Attempts to solve the problem of fatty spue formation, in the past have been almost exclusively confined to a search for the perfect fatliquor. Experience, however, has shown that while the choice of fatliquor is important, it is by no means the only factor to be considered. It is often found that firms producing a similar type of leather, and using the same fatliquor, experience fatty spue formation to different extents. This has led to a mass of contradictory reports on the subject, for which any satisfactory theory must account. The present laboratory work was undertaken to discover the method by which fatty materials migrate through leather, and to see how far this can be regulated by the normal operations of leather manufacture. It has been found that solid triglycerides and solid fatty acids can migrate from one surface of a piece of leather to the other, and if applied to the flesh side can appear in the course of time on the grain surface in a crystalline form which would undoubtedly be termed "spue" by the industry. The conditions under which this migration takes place depend on the nature of the fatty material; triglycerides spue when the temperature is relatively high (40°C. for tristearin) especially in dry atmospheres; fatty acids on the other hand migrate and appear as spue at temperatures lower than 20°C., particularly at high relative humidities. Thus it is possible for a skin to show spue when stored at low temperatures, to lose it temporarily when the temperature is raised, and then for the spue to reappear at the higher temperature. Fat is considered to migrate as a unimolecular layer on the fibres—the fat spreading over the surface in much the same way as it would spread over a water surface. The nature of the surface of the fibres is therefore important, and the various pre- and post-tanning operations have been studied to discover their influence on migration. As might be expected, the type of tanning is important; vegetable leather being far less likely to spue than chrome leather. With chrome leather, however, the final basification level is important; so is mordanting and dyeing. Tentative suggestions are made for alleviating spue on chrome leather, and further work is outlined.

NOTES & NEWS

NEW U.S. FINISH ADHESION TEST. *Lea. Tr. Rev.*, **124**, 3706, 91 (1957). A test has been developed at the Battelle Institute in the U.S. for measuring the adhesion of finish to leather which gives results independent of other finish properties such as elasticity and flexibility. In the test, a copper strip is bonded to the leather finish by means of a heat activated phenolic film (or bonding film). The force required to remove the copper strip, bonding film, and vertically from the leather surface is determined by conventional tensile-test apparatus. The 'Bonding Film Adhesion Test' has been applied to a variety of leathers, the finishes on kid leathers show very low adhesion values, cow hide shoe upper leathers show intermediate values, and upholstery leathers show high values. Within prescribed limits, variation of temp., pressure and dwell time during preparation of the specimens do not significantly affect the adhesion values obtained. There are some kinds of finishes to which the presently available bonding film will not adhere satisfactorily.

A NEW METHOD OF KID LEATHER SHRINKING. *Lea. Tr. Rev.*, **124**, 3708, 186, (1957). A new method of shrinking has been devised by Wade & Co., Ltd., Nottingham. The result is a very smartly finished leather with a distinctive crinkly texture. The new kid is called 'Broadtail', and it is claimed to have long wearing qualities. As a result of shrinking process, the skin is reduced in area by almost 50 per cent but several outstanding qualities are imparted to the leather. Foremost amongst these is resistance to scratching. Although soft and pleasant to touch the leather has resilience and toughness which gives long life and will enable shoes to retain their appearance over a longer period. Shoe and accessory manufactures have already taken up the leather is now produced in fifteen colours. 'Broadtail' has been designed for fashion and particularly suitable for dress shoe. Manufacturers have found that the leather lends itself to the pointed shoe designs. The leather has already been made up for belts and handbags.

ANTI-STAIN SUEDE. *Shoe and Lea. Rep.*, 285, 6, 40 (1957). New treatment to make suede leather water-resistance, can be applied in drum during wet processing of skins, following tanning and is said to substantially reduce fatliquoring step. Weight added by treatment is said to be only 3% as against 4-8% in ordinary processing. Stain repeller is "Scotchgard", produced by Minnesota Mining & Mfg. Co., St. Paul, Minn. While permits leather to "breathe", it also aids dye-fixing and gives added softness for dry cleanability. Also resists salts of Perspiration according to the firm.

WASHABLE WHITE LEATHER. *Shoe and Lea. Rep.*, 285, 5, 38 (1957). The Brezner Division of Allied Kid Co., Boston, has developed a washable white leather called "Cobble-White". It is tanned to resist cracking and splitting, and the company states it will stand up against hard-duty wear.

First co-operative tannery in U.P.

The first co-operative tannery ever to be established with a State government as a major partner, has been set up at Mohamedabad in Uttar Pradesh. The Rs. 200,000 project was first mooted by the Planning, Research and Action Institute of Lucknow to be run on a co-operative basis by the leather workers of 15 villages in the Farukhabad district. As it was beyond the means of the rural leather workers to finance the whole project, the State Government's participation and financial assistance was sought. The tannery, registered as a private limited company, has three shareholders. Eighty per cent of the shares are held by the Government, while 20 per cent each by the Leather Workers' Co-operative Society and the District Co-operative Federation. The Leather Workers' Co-operative Society was organised by the Planning, Research and Action Institute. The tannery is expected to produce high quality leather at competitive rates. The All-India Co-operative Union is watching the experiment with keen interest, as a successful working of the factory may pave the way for co-operative enterprises covering wider spheres of large-scale industries.

—*Evening News*, Bombay, dated 11th May, 1957.

Footwear unit at Erode proposed

A model footwear and leather goods unit is likely to be established soon at Erode under the All India Small Scale Industries Board in the Lower Bhavani Pilot Project area with a grant of Rs. 8,433 and loan of Rs. 73,864 from the Government of India.

—*The Hindu*, Madras, dated 17th May, 1957.

Industries for Himachal

A survey team of the Government of India would be visiting Sundernagar project area in Himachal Pradesh shortly for a detailed survey to assess industrial potential of the area. Sundernagar area was ideally suited for the development of leather goods industry. Besides the availability of necessary raw material, other economic factors were also favourable for its establishment. Out of some 5,000 cobbler population of Himachal about 16 per cent are concentrated in the Balh Valley in Mandi District. Government of India would be providing financial and technical assistance for the establishment of industry. Flaying and processing of leather will be undertaken to improve the quality of finished goods. Foot-wear manufacture will be given importance. Besides leather goods, wool and woollen-products industry is being organised in Himachal Pradesh on scientific and sound economic basis. There are about 6.5 lakh sheep in Himachal and now efforts are afoot to improve their breed by importing good quality rams from Australia.

—*Hind. Stand.*, Delhi, dated 27th May, 1957.

Rs. 1,70,000 scheme for Village Tanneries in Punjab

The Punjab Government has decided to establish ten co-operative village tanneries in the State, in the current financial year at a cost of Rs. 1,70,000. It is also proposed to organise 271 co-operatives of shoe-makers at a cost of Rs. 2,85,000 during the year.

—*Tribune*, Ambala, dated 10th June, 1957.

Animal hides project to be launched

The Planning Action and Research Institute of the U.P. Government is shortly launching a pilot project in tanning and curing of hides of forest animals in one of the NES blocks on the Indo-Tibetan border, it is learnt. It is known that there is a great

demand in foreign countries, particularly in the United States, for hides of animals like fox, for the manufacture of ladies' coats and hand bags. If the project proves successful, it will not only earn appreciable foreign exchange for the country, but also help in the improvement of the condition of the economically backward people of the border areas.

—*National Herald*, Lucknow, dated 6th June, 1957.

Leather Finishing Service Centre

The Leather Finishing Service Centre which the Madras Government propose to set up at Ambur at a cost of Rs. 4.5 lakhs is expected to go into operation in about six months' time, it is learnt. Enquiries indicate that necessary buildings for housing the centre are being erected and the required machinery has been ordered for. The object of the centre is, it is stated, to help the tanners to give a final finish to the half-tanned leather. At present, half-tanned leather is being exported for a lower price since tanners have no facility for full tanning. The centre would undertake the work of full tanning at a nominal charge. Machinery for this service centre is expected to cost about Rs. 2 lakhs. A cold storage plant will also be provided to enable tanners to deposit their raw hides on a nominal charge, in order to prevent decomposition.

—*The Hindu*, Madras, dated 29th June 1957.

Standards Institution Branch set up

The Indian Standards Institution has set up a branch office at Madras, for the benefit of the industries located in the southern region. This branch will disseminate information to the industry regarding standardisation and advise those engaged in industry and commerce in implementing and adopting Indian Standards, and will also conduct technical enquiries to give preliminary instructions in connection with ISI Certification Marks Scheme. Its stock of India, British, American and IEC Standards will be made available to the public either for reference or for sale. The Indian Standards Institution Branch which is located at No. 23, Nungambakkam High Road, will also interest itself in the forming of Standards Departments in local industries, if required.

—*The Hindu*, Madras, dated 22nd June 1957.

Export of Bone Sinews

It has been decided to continue the existing free licensing policy regarding export of bone sinews and other glue making materials to permissible destinations, excluding the Portuguese possessions in India, the Assistant Controller of Exports, Amritsar, notified on 22nd June 1957. Free licensing will be in force for shipment upto the end of December 1957. Shippers are however warned that they should not in their own interest enter into commitments with foreign buyers for exports beyond December 1957, as free exports may not be sanctioned after that date, the notification added.

Another notification said that crushed bones and bone grist allotments would be granted for July-December 1957 to those established shippers and crushers who were given quotas for January-June 1957. Crushing mills not eligible now but which might start production would also be granted allotments equivalent to 100 per cent of their production.

—*Indian Express*, Madras, dated 25th June 1957.

Russia buys Indian shoes

About 3,200 pairs of shoes out of the 18,000 pairs ordered by Russia would be delivered to Russian officials.

Russia had entered into an agreement with the Government of India to purchase two lakh pairs of shoes. Of these, 18,000 are to be made in Hyderabad. The shoes have been manufactured by small-scale units and will be delivered through the National Small industries Corporation. The price per pair ranges between Rs. 11 and Rs. 22.

—*Hind. Times*, Delhi, dated 13th May 1957.

Leather Exports to New Zealand.

Mr. S. K. Chowdry, First Secretary-designate (Commercial) to the High Commission of India, Wellington, New Zealand, met Mr. R. K. Rangan, Joint Chief Controller of Imports and Exports, and Chairman of the Leather Export Promotion Council, Mr. M. J. Jamal Moideen, Vice-Chairman and members of the Council on June 24 and discussed with them matters relating to trade expansion between the two countries with particular reference to

leather. The Council acquainted Mr. Chowdry of the possibilities of exporting finished leather and leather manufactures to New Zealand and explained to him that high quality wattle bark used in the tanning industry was grown on a commercial scale both in Australia and New Zealand and urged him to find out from the respective Governments whether the commodity could be made available to India by those countries. Mr. Chowdry assured the Council that he would do his best to promote trade between India and New Zealand.

—The Hindu, Madras, dated 29th June 1957.

Footwear-Cum-Production Centres in Madras

The Government of Madras are taking steps to set up three footwear training-cum-production centres at Pallavaram, Salem and Madurai, a model footwear and leather-goods unit at Erode. The Government has started a footwear unit at Gandhigram and a chappal unit at Ero

—The Hindu, Madras, dated 2nd July 1957.

C. L. R. I. NEWS

Practical Demonstration No. 6, the process for the manufacture of Box and Willow Sides has been successfully completed.

Practical Demonstration No. 7, the processes for the manufacture of East India kips using Karada and Konnam, and Rapid tannage of E. I. Skins has been started on 8th August, 1957.

Dr. Y. Nayudamma, Assistant Director-in-Charge, Central Leather Research Institute, attended the meeting of the Planning and Scientific Committee of The All India Kadi and Village Industries Commission at Wardha during 23rd and 24th July 1957.

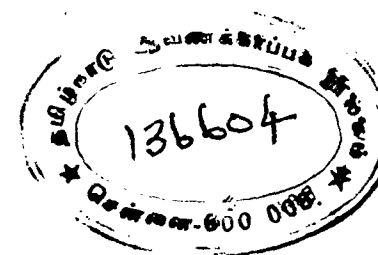
Dr. Y. Nayudamma, Assistant Director-in-Charge, Central Leather Research Institute, visited Tiruchirapalli on 2nd August 1957 to inaugurate the Science Association, St. Joseph's College, Tiruchirapalli and to meet the tanners of the district.

We welcome the following who are appointed in the Scheme of Indian Council of Agricultural Research.

1. Mr. S. P. Singaram, Junior Scientific Assistant (Chrome Retan.).
2. Mr. K. R. V. Thampuran, Junior Scientific Assistant (Mineral tannage).
3. Mr. V. V. Muralidhara Rao, Junior Scientific Assistant, (Fatliquors).

VISITORS

Name	Date of visit.
Trainees from Small Industries Service Institute, Madras with Mr. M. N. Sayeed, Junior Field Officer	18-7-1957.
Mr. Kenneth V. Thimman, Professor of Biology, Harvard University, Mass. U.S.A.	22-7-1957.
Mr. T. S. Sadasivan, Professor of Botany, Madras University	22-7-1957.
Mr. G. R. Rao, Hyderabad	1-8-1957.
Mr. Y. Papiah, Vice-Principal, St. Joseph's College, Tiruchirapalli	6-8-1957.
Mr. M. R. Thandani, First Secretary-designate, Embassy of India in Sudan	9-8-1957.



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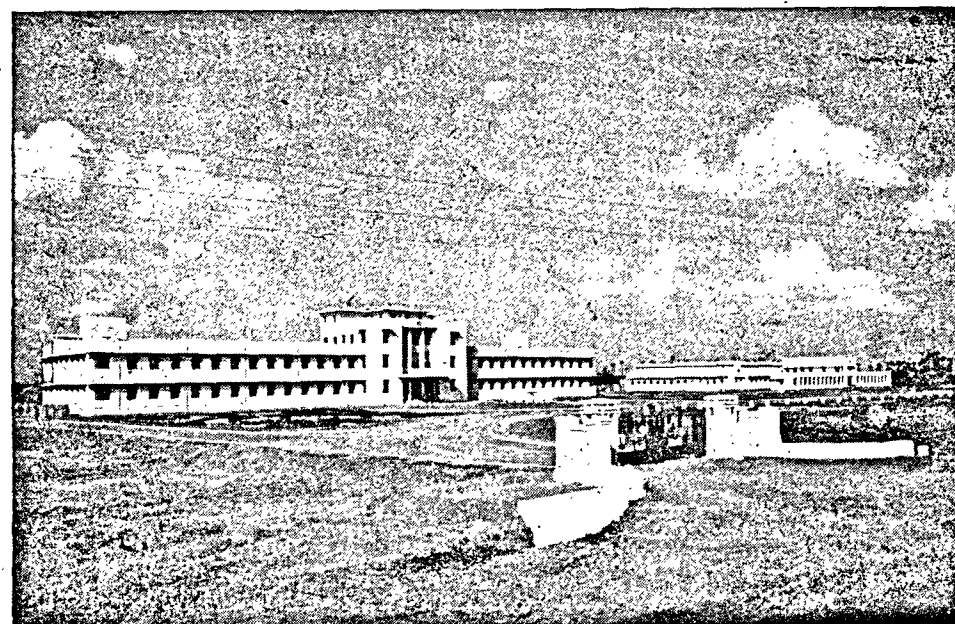


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INDIA

Bulletin of The Central Leather Research Institute

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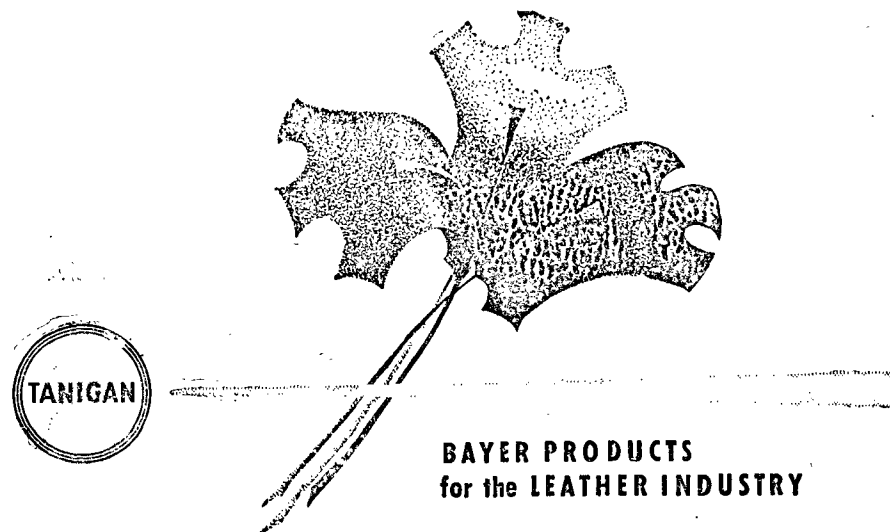
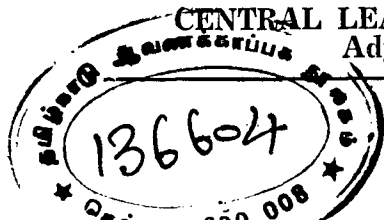
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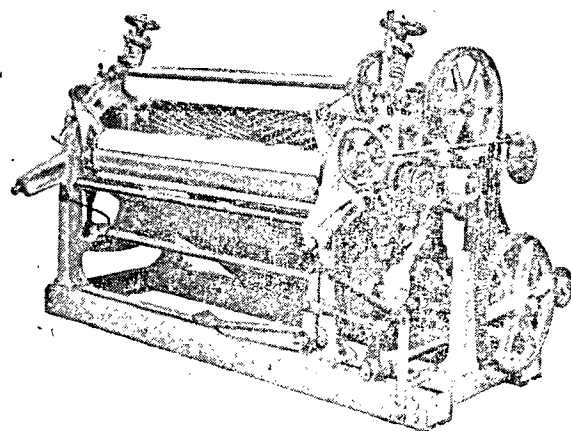
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COMBINATION TANNAGES — PART VI

Combination Chrome Vegetable Tanning in Single Bath*

T. S. RANGANATHAN & Y. NAYUDAMMA

SUMMARY

The leathers tanned with veg-chrome liquors were analysed stratographically for the chrome, organic matter and degree of tannage. The dyeing characteristics of these leathers, the physical properties like fulness, thickness, smoothness etc. and the microscopical assessment of these leathers were studied. The results indicate that the tanning with veg-chrome liquors results in leathers superior to those tanned with straight chrome, or vegetable or retanned leathers. The leathers possess both the characteristic properties of chrome as well as vegetable tanning material, together with properties of its own.

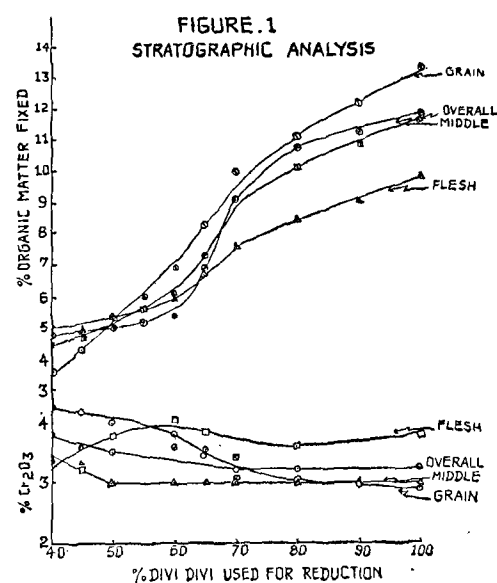
The preparation, the chemical composition and the tanning characteristics of the Veg-Chrome liquors, the optimum conditions for tanning and the effect of concentration, pH and various salts on tanning were discussed in the previous papers.^{1, 2}

Additional information on the chemical characteristics of the leathers produced by tanning with Veg-chrome liquors like the stratographic distribution of chrome, organic matter and degree of tannage; dyeing and finishing characteristics of the leathers, the microscopic and physical properties of the leathers tanned with vegetable-chrome liquors is deemed desirable. A study has been made in this direction and the results are reported in this paper.

Stratographic Study: Pickled pelt pieces (cow hides) of size 9" × 6" were tanned with Veg-chrome liquors giving in all cases the same amount of Cr₂O₃, i.e., 2% on the pickled

*Forms part of the thesis for M.Sc., of the Madras University.

pelt weight. The liquors used were obtained by reducing dichromate with increasing amount of divi-divi. After tanning in the usual manner, the pieces were split in the blue into three layers of equal thickness. Each layer was dried and analysed for chrome content ash, fixed organic matter and degree of tannage by the customary methods of analysis. The results obtained are shown in Figs. 1, 2 and 3.



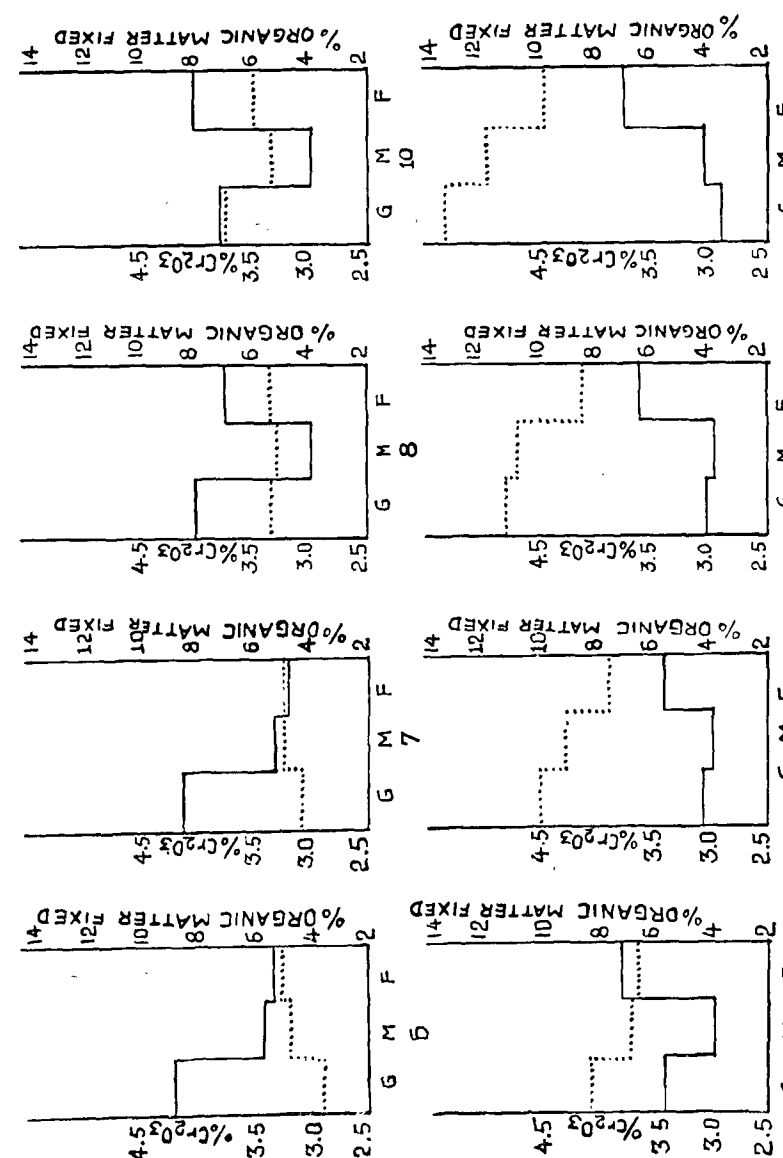
Data and Discussion

Penetration of Tannin: During the course of tanning, it was observed that the chrome complex coloured blue penetrated to the thickness of the pelt first and later followed by the brown coloured free vegetable tanning material.

Chrome Fixation: It is seen from Figs. 1 and 2 that with the increase in the amount of divi-divi used in the reduction of fixed amount of dichromate;

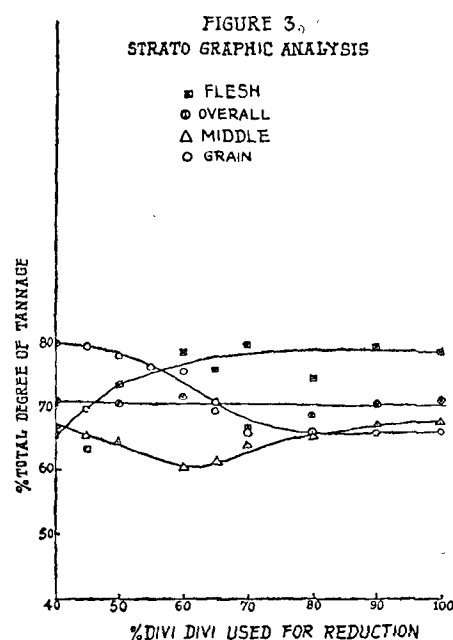
1. Overall amount of Cr. fixed in the total leather is slightly decreased (Fig. 1). This is due to the increase in

FIGURE 2. STRATOGRAPHIC ANALYSIS
CHROME 1
G-GRAIN 2
M-MIDDLE 3
F-FLESH 5



the amount of organic acids and degraded products of divi-divi that may complex with the basic chromium sulphate, further resulting in greater amounts of non-ionic and anionic complexes. The affinity for such liquors to collagen is less as compared to cationic chrome complexes.

2. The amount of chrome fixed in the grain layers gradually decreased; decreased in the beginning but was fairly constant in the middle layers; increased upto a certain extent and later remained constant in the flesh layers. This may probably be due to the increase in the size of the tanning complex with the increase in the divi-divi used for reduction. Flesh layers are more porous than grain layers accounting for the variation in the fixation of Cr.



3. When more than 70% of divi-divi is used for reduction, the distribution of chrome is more uniform and even in the grain and middle layers as seen in Fig. 2.

Fixed Organic Matter: The organic matter fixed in the leather tanned with veg-chrome liquors is contributed by

organic matter present in the tan-liquor in the free form as well as that bound within the chrome complex.

From Fig. 1, it is seen that with the increase in the amount of divi-divi used for reduction:

1. There is an increase in the amount of fixed organic matter which is expected.

2. In spite of a slight gradual decrease in the chrome content, there is an increase in the fixed organic matter which is due to the excess free vegetable material present in the liquor.

3. A sharp increase in the curves (Fig. 1) is observed where more than 70% divi-divi was used on the weight of dichromate for reduction. This may indicate that upto 70% divi-divi, most of the vegetable matter may be bound within the chrome complex, more and more amounts of vegetable matters complexing with chrome, leaving very little free organic matter, that accounting for the increase in fixed organic matter, in spite of the decrease in the chrome content.

Above 70%, a considerable amount of free organic matter may be left behind which may directly react with the protein.

4. The fixed organic matter is fairly uniform in all the layers upto a point (70% divi-divi used). Above this point, the amount fixed is greater in grain, middle and flesh layers in that order. In this region, the fixation of organic matter is in the reverse order to chrome.

Overall Degree of Tannage: This figure is calculated as follows:

Degree of tannage due to chrome (i.e., % chrome $\times 2.73 \times 6.66$) + Degree of tannage due to fixed organic matter.

From Fig. 3 it is seen that with the increase in the amount of divi-divi used for reduction:

1. The overall degree of tannage remained the same. This is a remarkable observation in tanning with veg-chrome liquors. The degree of tannage remains constant; only the proportion of tannage due to the individual tanning agent chrome and veg. may vary.

2. The degree of tannage curves for individual curves, i.e., grain, flesh and middle very closely resemble those for chrome fixation as shown in Fig. 1. This indicates that the tanning is obtained mainly by the chrome-veg. complex and not by the individual chrome or vegetable tanning agents.

Dye Fixation

In order to find the behaviour of the hide powders tanned with the different veg-chrome liquors prepared towards different dyes, experiments were carried out using pure acidic and basic dyes. The dyes used were Acid Fuchsin and basic Fuchsin.

Procedure: An amount of tanned powders equivalent to 1 gm. of the dry powder was taken in dry beakers and the solution containing 15% of the dye on the dry weight was pipetted into the beakers, keeping the total volume of water constant. These were left for 48 hours with occasional stirring. After this period, the solution was filtered and the filtrate and washings were made up in a standard flask. The percentage transmission of these solutions was determined in a photo-electric colorimeter (Craftsman Balance Cell) using filters No. B₁ and G.

Generally acid or direct dyes are used for dyeing chrome leathers, as these have an affinity for such leathers, carrying a positive charge and basic dyes have got a great affinity for vegetable tanned leathers, carrying a negative

charge. From the results, it is seen even when the vegetable tanning material content is increased, the amount of acid dye taken up is almost the same, thus showing that

TABLE 1

Acid Fuchsin

Divi-divi used per 100 gm. bichromate.	Optical density.	% Transmittance.
40	0.208	62.0
50	0.210	61.7
60	0.208	62.0
65	0.209	62.0
80	0.208	62.0
100	0.204	62.2

Basic Fuchsin

40	1.170	5.78
50	1.120	6.22
60	1.105	6.60
65	1.100	6.80
80	1.090	7.30
100	1.060	7.80

the acid fixing groups, i.e., amino groups of the hide powder are still available for the acid dye. Also the vegetable tanning material fixed should be either within the chrome complex or combined with the hide powder, not evidently at the amino groups. The depth of the colour in the powder which was found to increase might be due to the vegetable tanning material present. It has also been observed that while dyeing such leathers, the dye penetrates into the leather very quickly, when compared with the simple

chrome tanned leathers. This property will be very useful when suede leathers are to be dyed, as thorough penetration is essential for such leathers.

While dyeing with basic dyes, it has been observed that the uptake is increased when more vegetable tanning material is present in the tanned powders. It has been pointed out above that the charge of the leathers is not much affected by the increase in the vegetable tanning material content. Therefore, only the same amount of fixation should be expected in all cases. But the increase in the uptake can be explained as follows: Since the chrome content of the leathers is decreased when more of vegetable tanning material is used in the reduction, more COOH groups are available for fixation of basic dyes. The increase can also be due to the vegetable tanning matter, because it has got a capacity to fix basic dyes. In the case of the basic dyes also, the increase in the depth of colour is due to the influence of the fixed organic matter.

Microscopic Study: With a view to find out the structural changes that take place when tanning with veg.chrome liquors, containing increasing amounts of the vegetable tanning materials, the leathers tanned with these were examined under a microscope. The tanning procedure is as follows: A piece of pickled pelt was cut from the exact butt of the cow hide and then split to uniform thickness. This was cut into small strips parallel to the back-bone, so that all the strips would be representative samples for comparison purposes. The tanning procedure was the same as for hide powder tanning. The tanned pieces were washed well and dried. Sections of these pieces were taken for the microscopical examination.

Observations: With the increase in the amount of divi-divi used for reduction, the angle of weave was found to increase from medium to medium high, as also the fulness

of fibre bundles, deposition of colouring matter and the thickness of the grain layer.

Leathers of high chrome content have been shown to be characterised by low fulness of fibre bundles.³ It was noted from the photomicrographs that fulness of fibre bundles increases when more of divi-divi is used in the reductions. According to the above statement, the chrome content should decrease with increase of fulness, which fact has been clearly shown in the data for Cr₂O₃ content of the tanned hide powders.²

It has been shown from the data obtained in the stratigraphic analysis of the leathers that, when the vegetable tanning material content increases in the liquors, more organic matter is fixed on the grain layer and less Cr₂O₃. This greater fixation of vegetable material will result in increase in the thickness of the grain layer, since it has got a filling action which is shown in the microscopical assessment.

When the angle of weave is increased, naturally the thickness of the leather should also increase. This increase in thickness has been verified (see below). The tightness also should be more, since more of vegetable filling material is fixed on the grain, as the divi-divi used for reduction is more, and also because of increase in the angle of weave.

The production of leathers with fine and tight nap can be attributed to the angle of weave. When the angle of weave is low, i.e., parallel to the grain surface, the flesh side will be wooly in nature. But when it is more, the fibres get closer to one another, resulting in the tight nap. Therefore, when more divi-divi is used the angle of weave goes up, resulting in the production of finer and tighter nap.

Physical Properties of leathers tanned with Veg-chrome Liquors: Leathers were produced by tanning with the

liquors prepared, from the same pickled cow hide butt, giving the same percentage of Cr_2O_3 , on pickled weight. The tanned pieces were washed, neutralised with 1% bicarbonate, washed well and fatliquored with 2% Cremol F and $\frac{1}{4}\%$ alum oil. After fatliquoring, the pieces were piled overnight, sammed, set and allowed to dry. The dried pieces were conditioned in moist saw dust, staked and nailed on boards. The pieces were then buffed and trimmed for examination.

With the increase in the amount of divi-divi used for reduction, the following properties are observed:

i. *Fulness*: As the vegetable organic matter content increases, the fulness goes on improving, the leather tanned with liquor No. 10 having extremely good fulness.

ii. *Thickness*: For this, separate pieces were tanned. Before tanning, the pieces were split to a uniform thickness of 2 mm. The thickness after finishing is as follows:

Liq. No.	1	2	3	4	5	6	7	8	9	10
Thickness mm.	2.00	2.30	2.35	2.40	2.45	2.5	2.55	2.60	2.60	2.65

It will be noted that the thickness has been increased considerably.

iii. *Smoothness*: This is not affected.

iv. *General feel and appearance*: Improved with more and more vegetable tanning material.

v. *Colour*: The leather tanned with liquor No. 1 appeared just like any other chrome tanned leather. As the vegetable tanning material content goes up, the colour of the leather changed from blue to light brown and to brown, like vegetable tanned leather.

vi. *Stretch*: Becomes less with increasing amount of divi-divi.

vii. *Nap*: Becomes finer and tighter, as the organic matter content in the liquors increases.

viii. *Tightness and grain*: Increases.

ix. *Crackiness of grain*: The pieces do not crack even on double folding.

x. *Key test*: All the pieces stand this test.

xi. *Tear strength*: High in all cases.

xii. *Shrinkage temperature*: This is found to increase.

The use of aromatic compounds along with chrome liquors has been found to increase the filling action of the liquors.⁴ In the veg-chrome liquors also, the amount of such compounds increases when more divi-divi is used for the reduction. Therefore, this results in increasing fulness, tightness, nap, etc. The same is responsible for the increase in substance also. This kind of single bath chrome and vegetable tanning produces leathers which resemble in most of the properties the chrome-retanned leathers. But chrome-retannage somewhat roughens the grain and also the grain cracks on double folding. Therefore, this process is superior to the chrome-retanning since it produces smooth and noncracky leathers, retaining at the same time, the desirable properties of chrome-retanned leathers.

Acknowledgement

These papers, parts IV, V and VI forms part of the thesis towards M.Sc. Degree of the Madras University of one of us (Shri T. S. Ranganathan). Our thanks are due to the University of Madras for permitting us to publish this series of papers.

Our thanks are due to the Microscopy Section for the Microscopical assessment of leathers.

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A NEW TECHNIQUE FOR THE DETECTION OF DAMAGED SHEEP-WOOL

S. K. MITRA

Sheep-wool is one of the most important of the textile fibres. The bulk of the wool of commerce is obtained in the form of fleece and skin wools. Skin wools are collected from dead sheep by means of depilatories or by sweating process. They may have the cuticle scales damaged by

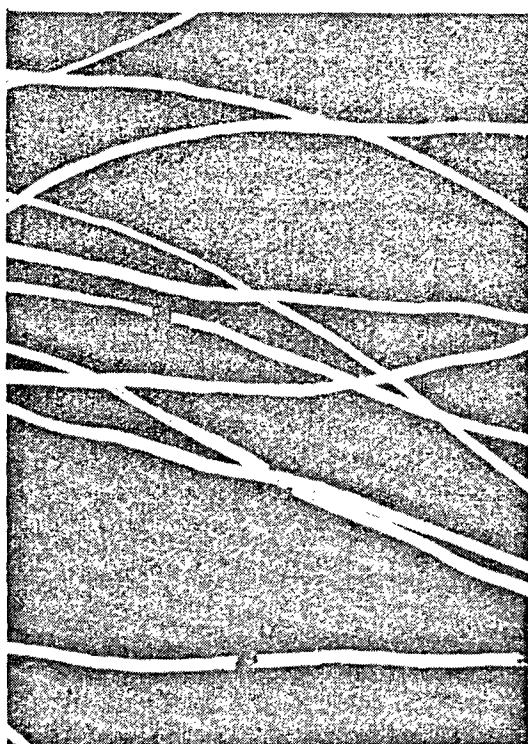


Plate 1: Undamaged wool

the chemical action of the depilatories used or by the bacterial action in the sweat pits. Fleece wools are obtained

from living sheep and are usually received "in the grease", that is unwashed and with all the grease, dirt, etc., present. They are therefore treated with alkaline liquors and scoured in the machine. The qualities of the wool fibres may be seriously injured due to the removal of the cuticle scales by injudicious treatment in the above process. Further, a considerable weight of wool is now chlorinated. Treatment with hypochlorite solutions has the effect of partially removing the cuticle scales, and of rendering the wool less liable



Plate 2: Damaged wool

to felting. Over-chlorination removes the cuticle scales entirely, rendering the wool worthless. The detection and estimation of these damages to wool fibres are very important to determine and assess the quality of the raw wool, but have been hard to estimate quantitatively; and a method

was sought for. A very simple and quick method has now been developed by which damaged sheep-wool (white variety only) can be detected and estimated in 15 to 20 minutes by microscopical technique. The method is as follows:

The sample of the wool to be examined is soaked for 5 minutes in Lactophenol cotton blue solution prepared by dissolving 0.05 grms. cotton blue in 10 cc. distilled water and 20 c.c. glycerine, and adding 10 gms. Phenol and 10 c.c. Lactic acid to it. The treated wools are then washed in 2 to 3 changes of water to remove the adhering cotton blue solution and dried by pressing lightly between two pieces of filter papers. Lactophenol cotton blue stains the damaged wool fibres in which the cuticle scales have been removed or damaged especially by the action of alkali in the washing and scouring operation. The wools are then placed on the stage of a stereoscopic microscope fitted with 2x objectives and 8x eyepieces, and examined by reflected light using a pointolite lamp as the source of illumination. Damaged wool fibres appear dark blue whereas undamaged wools appear either white or slightly bluish-white. 200 wools are then counted from different fields under the microscope noting the number of damaged and undamaged wools, and the percentage of damaged and partly damaged wools is determined. The technique presented requires only 15 to 20 minutes in all, and appears to be a promising tool for the determination of the percentage damage in a consignment of raw wool. The staining effect has been demonstrated in the photomicrographs.

Thanks are due to Dr. Y. Nayudamma, Assistant Director-in-charge, Central Leather Research Institute, for permission to publish this technique.

Microscopical Laboratory,
Dated 2-1-57.

TECHNICAL SEMINARS

Some Leather Defects due to Animal Diseases*

R. BHASKARAN

The different ways by which the diseases that affect the living animal affect the leather industry were described from the following points of view, viz. (i) Animal diseases communicable to man through the agency of hides and skins, (ii) Diseases that might be carried through hides and skins to disease free countries and (iii) diseases that affect the value of leather produced.

The damages caused by insect pests were demonstrated along with the pests causing the damage with a description of the method by which such damages were caused. The talk was illustrated by micro-projections, lantern slides and leather samples showing such defects.

*Summary of the paper read at Seminar held on 31st May, 1957.

The Grain Pattern of Hides and Skins†

S. K. MITRA

The grain pattern which determines the outward character of the final leather, and provides an easy means of identifying different types of leather, varies not only with the species of the animal but also over the area of the same hide or skin. The design on the outer surface of the finished leather produced by the arrangement of hair follicles is distinct for each species of animal and each pattern is a

†Summary of the Seminar talk delivered on 12-7-57.

composite of the openings of hair pores, presence or absence of nerve Papillae and the cumulative effects of the structures underlying the surface. The normal design of the surface pattern in a hide or skin is influenced by a number of factors including depth, diameter, direction and inclination of hair follicles, number of hairs per unit area, parity and disparity in hair pores, development of nerve papillae etc. The conditions which influence the character of the grain pattern indirectly are: thickness of the papillary layer, number of sudoriferous and sebaceous glands per unit area of the hide or skin, localised growth of elastin forming grain indentation, contracted hair muscle etc. A relatively thicker papillary layer in the case of calf skin partly for its finer feel of the grain pattern, and one of the reasons of very rough pattern in buffalo hide is its sparse hairs with much developed nerve papillae. The naturally coarse pattern in sheep skin is partly due to its thicker and longer hair follicles with high inclination and partly to the sponginess of the papillary layer. The natural coarseness in the case of goat skin is modified to a great extent by low inclination of the hair follicles and a relatively more compact papillary layer.

Of the abnormal conditions which affect the nature of the grain pattern are various diseases especially the nutritional one. Cockle is an example of nutritional disease which occurs as rounded nodules in the corium making the grain pattern coarse. The complexity of the grain pattern and its natural variation over the entire area of the same hide or skin make it very difficult to produce leather with uniform grain pattern all over. A biological survey of Indian hides and skins from leather making point of view has been undertaken at the Microscopical section of the Central Leather Research Institute to study the histological variations due to different places of origin and micro-tannological effects during processing.

CLASSIFIED ABSTRACTS

THE ANALYSIS OF CURED HIDES FOR LEATHER MAKING SUBSTANCE. R. M. Lollar. *Via. Shoe and Leather Repr.* 286, 6, 20 (1957).—(Paper presented at Leather Chemists Convention). The unique characteristically high content of the amino acid, hydroxyproline, in collagen and the method of assay for this amino acid developed by Neuman and Logen, suggested an assay method for the content of "leather making substance" in cured cattle hides. This paper presented information on the precision of the assay method for hydroxyproline, as well as on the recommended hydrolysis procedures to free this amino acid from collagen.

SOME ECONOMIC ASPECTS OF GRUB CONTROL. F. O'Flaherty. *Via. Shoe and Leather Repr.*, 286, 6, 20 (1957).—(Paper presented at Leather Chemists Convention). With the development of truly efficacious treatments for the control and elimination of grub infestation in cattle, there arise many economic problems. These were delineated and discussed with the purpose of stimulating interest in establishing practical use of the newer treatments.

PROCESSES PRIOR TO TANNING

CHEMICAL STUDIES ON THE LIMING OF ANIMAL SKIN. VI. EFFECTS OF ORGANIC NITROGEN COMPOUNDS IN ACCELERATING THE UNHAIRING OF ANIMAL SKINS BY LIME LIQUORS, PART I.—AMINES. H. Toyoda and A. Fukami. *Repts. Gov. Chem. Ind. Research Inst., Tokyo*, 51, 429-36 (1956) (English summary). *Via. J.A.L.C.A.* 52, 5, 284 (1957).

The accelerating action of various amines, in M concentration in lime liquor at 25°C., on the unhairing of goat and cattle hide, was studied by measuring the depilation load (*Lennox. J.A.L.C.A.* 41, 91, 1940). The most active compound studied was diethylamine. Next came dimethylamine, ethylamine and methyl-n-butylamine, Cyclohexylamine, monoacetylenediamine, and N, N-diethylethylenediamine were least effective. Tertiary amines and aromatic amines were without action. The introduction of negative groups, such as acetyl and phenyl groups, into the amine molecule decreases the unhairing power markedly.

THE DEPILATION OF SHEEP-SKINS WITH ACETIC ACID. M. S. Currie, J. B. Moore, and J. S. Chisholm. *New Zealand, J. Sci. Technol.*, **38B**, 19-30 (1956). *Via J. A. L. C. A.*, **52**, 5, 285, (1957).—Diastase was found to have no wool-loosening action, under sterile conditions, in phosphate buffer at pH 6.6 and 37°C Pectinase produced moderate wool loosening in phthalate buffer at pH 4 and 37°C., and very marked loosening under the same conditions in acetate buffer. The discovery that equal loosening took place in the acetate buffer without the enzyme led to a re-examination of dewooling with acids. In small scale experiments, satisfactory wool loosening was obtained with 0.05 M acetic acid, buffer at pH 4 and 37°C., in 16-20 hrs., or by a 45 min. soak in 0.5M acetic acid followed by wringing and storage at 32°C., for 22 hrs. Other organic acids gave some loosening but were less affective than acetic. Tests with ammonia confirmed previous reports that the unhairing action is inadequate for commercial wool pulling, and decreases with time because of excessive swelling. Attempts to loosen the wool with acids at room temperature were unsuccessful. When the procedure that worked well on small pieces was applied to whole skins, patches of tight wool remained. Both the acid-treated pelt and the wool deteriorated on storage, even though the pelt was pickled and the wool was washed.

TANNING

VEGETABLE TANNING

FORMATION OF RESINOUS, GUMMY SUBSTANCES IN SUMAC EXTRACTS BY ALTERATION OF THE NON-TANNINS. A. Yague Gil. *Bol. Asoc. Quim. Espan. Ind. Cuero*, **15**, 35-42 (1954). *Via J.A.L.C.A.* **52**, 6, 352 (1957).—The author makes a careful study of the variations of the composition of sumac extracts obtained and treated under different conditions (aqueous alcohol or water extractions, detannization, etc.). He finds that in an extraction with aqueous alcohol (1:1) the relation T/NT is higher than in a water extraction, with a much smaller amount of sugars and an absence of resins and gallic acid, and also a smaller alteration of the solutions. The nontannins form resinous, gummy substances which are known to be formed from the sugars. Hides tanned with an aqueous alcohol extract were of normal aspect, whereas hides tanned with a water extract, rich in sugars and containing gallic acid, were firm and showed a much darker color.

INFLUENCE OF VARIOUS FACTORS IN THE EXTRACTION OF OAKWOOD TANNERS. M. Zurakowski and W. Wisniewski. *Przegląd Skorzany*, 1954, No. 10, 17: *Polish Tech. Abstr.* 1955, No. 2, 145, *Via J.S.L.T.C.* **41**, 5, 185 (1957). For industrial extraction, the wood should be reduced to pieces of less than 0.5 cm., and for thicker shavings, time or temp. should be increased. The optimum extraction temp. is 97°C, and the maximum extraction time per diffuser should not exceed 2 hr. If pressure extracted, the pressure was satisfactory at between 1-2 atmos., and extract yield decreased at 3 atmos., and a temp. of about 135°C.

CHROME TANNING

INFLUENCE OF TEMPERATURE ON THE REACTION OF A CHROME TANNING SOLUTION WITH CALFSKIN SQUARES. Joseph R. Kanagy. *J.A.L.C.A.*, **52**, 3, 142, (1957). The influence of temperature on chrome tanning is of interest because the data may be used to calculate heats of reaction and to obtain fundamental information on the mechanism of tanning. The procedure used was to soak 2 grams of dry-dehaired, delimed hide in water until fully swollen and then add varying amounts of chromium from a 33½% basic, SO₂-reduced, tanning agent. Determinations of hide substance, chromic oxide, and total sulfate were made on the washed, tanned squares. Under all conditions the amount of chromic oxide (Cr₂O₃) retained at 50°C. was 3 to 4 times greater than that retained at 0°C. Addition of formic acid decreased the amount retained at all temperatures. From the data obtained at different temperatures, it was found that the combined chrome complex had an acidity of about 41%. The amount of protein-bound acid was found to be a constant at about 0.39 milliequivalents per gram of collagen. The effect of increasing temperature on chrome tanning is explained by increased hydrolysis, accelerated by an increase in the ionization constant of water, to form larger chrome complexes.

STUDIES ON THE TANNING PROPERTIES OF CHROME LIQUOR PREPARED FROM ORGANIC REDUCING AGENTS. IV. INFLUENCE OF AGING UPON THE MASKING EFFECT OF VARIOUS ORGANIC ACIDS: Y. Sakimoto and T. Osugi. *Mem. Fac. Agr. Hokkaido Univ.*, **2**, 195-201 (1956) (English summary) *Via J.A.L.C.A.* **52**, 5, 288 (1957). Cr alum solutions were treated with 0.25 and 0.5 mol organic acid (HCOOH, CH₃COOH, (COOH)₂) per mol Cr and aged. Determinations were made of pH, hot and cold basicities, and amounts of HCl reacting

with hydroxo groups of the Cr. complex. On aging, pH values increased in the presence of the organic acids and declined in their absence. Basicity increased in the presence of organic acids, especially oxalic, and was unchanged in their absence. The calculated amounts of acido groups entering the Cr complex declined in the order: oxalate, formate, acetate. The uptake of HCl by hydroxo groups decreased with aging in the presence of 0.25 mol formic and acetic acids, was constant in the absence of organic acids, and increased in the presence of 0.25 mol oxalic acid. In the presence of 0.25 mol oxalic acid. In the presence of 0.5 mol organic acid, the uptake of HCl increased for all the acids, decreasing in the order: oxalic, acetic, formic.

OTHER TANNAGES

TANNING LEATHER WITH ALUMINIUM COMPOUNDS IN COMBINATION WITH CHROMIUM. L. B. Sakin and I. P. Strakov. *Tanner*, 12, 2, 51, (1957). The chromium-alum tanning compounds were prepared in three alternative ways: 1. A mixture of potassium bichromate, alum and sulphuric acid was prepared and glucose was added gradually to reduce. 2. Potassium bichromate, alum $\frac{1}{2}$ mol of sod. formate per atom of aluminium and sulphuric acid further reduced by glucose. 3. 33% basic chromium compound is mixed with aluminium compounds of 20% basicity and the mixture warmed for an hr., in a water bath at 40 to 42°C. In tanning with these combination salts it is observed that the best combination is achieved by mixing aluminium compounds into a solution of potassium bichromate and acid with subsequent reduction of chromium. Better results were obtained when sod. formate is added.

—Y. N.

THE EFFECT OF SALTS IN FORMALDEHYDE TANNAGE. I. Y. Nayudamma, S. K. Jayaraman and T. S. Krishnan—*J.A.L.C.A.* 52, 5, 238 (1957). Collagen pieces were tanned with formaldehyde at pH 7 in the presence of equimolecular quantities of 20 different salts. In general the presence of salt raised the fixation of formaldehyde and the shrink temperature. Three of the more effective salts were used at different concentrations at pH 7, and at constant concentration at pH values from 2 to 11. These salts caused increased fixation at pH values below 3.5 and above 5, and decreased fixation at pH 3.5—5.

UTILISATION OF SULFITE CELLULOSE WASTE LIQUORS AS TANNING MATERIAL. IV. TITRATION CURVES

AND ABSORPTION CURVES OF VARIOUS LIGNIN EXTRACTS. Y. Sakimoto. *Jan. J. Zootech. Sci.*, 26, 145-47 (1955) (English Summary) *Via J.A.L.C.A.* 52, 5, 292 (1957). Titration curves and absorption curves as functions of pH are given for 6 lignosulfonate extracts and compared with those of typical vegetable tannins. The curves for the lignosulfonates appeared to vary with the previous treatment of the extract. V. THE PREFERENTIAL TANNIN ABSORPTION BY HIDE POWDER FROM BLENDED TAN LIQUOR (2). Y. Sakimoto and K. Katayama. *ibid.*, 149-53 (1955) (English summary).—Preferential absorption of one or the other tannin in a binary blend was measured from the gallic acid and ethyl acetate values of the liquors from which part of the tannin had been absorbed by hide powder. Each blend was tasted at its natural pH and at pH 6. The following preferential absorptions are reported. (1) wattle-mangrove, wattle, more at pH 5.8 than at 4.3; (2) quebracho-wattle, quebracho, especially at pH 6; (3) quebracho-mangrove, quebracho, especially at pH 4.1; (4) wattle-lignosulfonate, wattle (slight) at both pH values; (5) quebracho-lignosulfonate quebracho at both pH values; (6) wattle-chestnut, chestnut (slight). VI. PREFERENTIAL TANNIN ABSORPTION FROM BLENDED LIQUORS (3). Y. Sakimoto and K. Katayama, *Bull. Japan. Assoc. Leather Technologist*, 2, 146-51, (1956) (English Summary). Pieces of limed, de-haired, and delimed horsehide were partly tanned with various blends and then retanned with the same blends at 3% concentration for 3 hr., using 500 ml. liquor to 200 g. hide. Each blend was used at its natural pH value and at pH 5.5. Preferential absorption was measured by determining gallic acid values and ethyl acetate values for the spent liquors. The reported results for preferential absorption are: (1) chestnut-wattle, none at pH 3.6-4.6, or 5.5 (2) chestnut-soluble quebracho, chestnut at pH 5.5 but not at 3.7-4.4; (3) chestnut-mangrove, chestnut at pH 5.4 more than at 3.5-4.7; (4) chestnut-Hansa D (lignosulfonate), chestnut at pH 2.7-4.3 and even more at 5.5; (5) wattle-soluble quebracho, wattle at pH 4.5 and 5.3-5.7; (6) wattle-mangrove same as (5); (7) wattle-Hansa D, wattle at pH 3.4-4.6 and 5.5; (8) soluble quebracho-mangrove, quebracho, at pH 4.4-4.6 and much more at 5.3-5.6; (9) soluble quebracho-Hansa D, quebracho at pH 3.6-4.4 and 5.4-5.7. In general, preferential absorption of the natural tannin increases with pH value. Wattle is preferred to chestnut for blending with lignosulfonate.

PROCESS AFTER TANNING

PHYSICAL PROPERTIES OF LEATHER FATLIQUORED AT DIFFERENT OIL LEVELS. *Victor Mattei and William T. Roddy. J.A.L.C.A. 52, 3, 110, (1957).* The physical properties of chrome-tanned leather fatliquored at different oil levels give information that is important in elucidating the fatliquoring mechanism. In the present study the amount of oil taken up by the leather was varied by fatliquoring at different oil levels. The tests used to measure the physical properties were tongue tear, stitch tear, tensile strength, elongation component, needle puncture and hardness. Statistical analyses of the data were made, and the data are presented to show the influence of the amount of oil on the physical properties of the leather. Cross-sections of the leather were prepared and studied to determine the deposition at the different oil levels.

THEORIES

STUDIES ON THE REACTIVE GROUPS OF COLLAGENS II, EFFECT OF THE REACTIVE GROUPS ON THE FIXATION OF CERTAIN ALDEHYDES. *S. M. Bose and K. Thomas Joseph. J.A.L.C.A., 52, 4, 200, (1957).* To obtain information as to the specific reactive groups of collagen that react with aldehydes, the fixation of formaldehyde, acrolein, and crotonaldehyde, by various modified collagens and by a polyamide, has been studied.

HEATS OF WETTING OF MODIFIED COLLAGEN AND OTHER MATERIALS—*Joseph R. Kanagy and James M. Cassel—J.A.L.C.A. 52, 5, 248 (1957).* The integral heats of wetting of modified collagens and other organic materials, including other proteins, plastics, and carbohydrates, were determined. Modifying collagen by treatment with acetic anhydride, methyl alcohol, or nitrous acid reduces the heat of wetting and the amount of moisture adsorbed under controlled conditions.

In general, materials that have a high percentage of hydrophylic groups give the highest heats of wetting. These hydrophylic groups include the free basic and acidic groups on side chains, hydroxyl groups and nonhydrogen-bonded peptide groups. The heat of wetting, is, however, also influenced by crystallinity and the physical state of the material. The basic and acidic groups of proteins attract water more strongly than the hydroxyl groups of carbohydrates. The determination of the heat of wetting offers a convenient procedure for measuring the hydrophilic properties of a material.

TESTING

DIFFERENTIATING TITRATION OF ACID MIXTURES IN ACETONE. *J. S. Fritz and S. S. Yamamura. Anal. Chem., 29, 1079 (1957).* Using a glass-calomel electrode system, phenols, carboxylic acids, enols, imides and sulfonamides were titrated successfully. Acetone was used as solvent and Tetra alkyl Ammonium Hydroxide in benzene-methanol as titrant.

— Y. N.

RAPID QUANTITATIVE DETERMINATION OF HYDROQUINONE. *C. B. Jorden. Anal. Chem., 29, 7, 1097 (1957).* A rapid and accurate method is described for the determination of hydroquinone. Dissolve 1 gm. of hydroquinone in distilled water and make up 500 ml. Titrate a 50 ml. liquor with 4% aq. ferric chloride hexahydrate at a rate of 10 to 12 drops per minute, using a yellow pigment for the titration. Agitate after each addition of a drop till the green colour is no longer found. The pH of the aqueous sample containing the unknown quantity of hydroquinone is adjusted to between 3.5 and 5 by dilute hydrochloric acid or sodium hydroxide, then titrated with ferric chloride solution. Grams of hydroquinone in sample is equal to: ml. of FeCl_3 used in sample titration/ml. of FeCl_3 used in blank titration X Wt. of C.P. Hydroquinone/10.

— Y. N.

FLEXIBILITY GAUGE. *Alfred W. Hopton. J.A.L.C.A., 52, 3, 124, (1957).* A description is given of a simple, rugged, and portable instrument for measuring the flexibility and resiliency characteristics of both light and heavy leathers. The usefulness of the instrument is illustrated by data obtained on a wide variety of leathers.

PROVISIONAL METHODS OF ANALYSIS USED AT THE EXPERIMENTAL STATION FOR THE LEATHER INDUSTRIES OF NAPLES (ITALY), *Cuoio, Pelli, Mat. Concianti, 32, 89-115, 180-215, 271-96, 402-418 (1956) Via J.A.L.C.A. 52, 5, 283, (1957).* Methods for the determination of the following physical and mechanical properties of leather are described in detail: sampling, conditioning, thickness, area, specific gravity (apparent), tensile strength, stretch, tongue tearing strength, split tear, buckle tear, stitch tear, hardness, rigidity, compressibility, abrasion resistance,

resistance of the grain to compression; permeability to air, to water vapor, to water (both at constant and variable pressure); water absorption, heating test, shrinkage temperature, gelatinisation temperature, resistance to rubbing, resistance of the dyes to water (cold and warm) and to artificial perspiration, washing test, filtration test (for chamois leather, aging damage test).

A COLLABORATIVE STUDY ON THE CINCHONINE METHOD FOR DETERMINATION OF LIGNOSULFONATES IN VEGETABLE EXTRACT BLENDS. *Sverre Dahl, and Hohn Mandel. J.A.L.C.A. 52, 4, 184, (1957).* Collaborative analyses were made by six laboratories on 12 samples (one vegetable extract, four commercial lignosulfonate tanning agents, and seven blends of vegetable tanning materials and lignosulfonates). Analyses were done by the cinchonine method previously reported by this committee. The results were subjected to statistical analysis. The committee finds that the method is not sufficiently accurate to be adopted as Provisional Method of ALCA.

DETERMINATION OF THE SULPHATE ION WITH THE COMPLEXONS. *A. Casini Ann. Chimica, 46, 697-702 (1956). Via. J.A.L.C.A., 52, 5, 282 (1957).* (I) Determination in the presence of ammonium or alkaline salts: To 100 ml. of heated solution add an excess (20-40 ml.) of 0.1 M solution of Barium chloride ($\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$), and let a = no. of ml. employed; BaSO_4 precipitates; boil the solution (with the precipitate) for 1-2 min., and after cooling (the solution has pH 4-6), and 3 drops of naphtholphthalein solution (0.1% in 70% ethanol), and titrate without filtering with 0.1 M Complexon, until the colour turns from pink to greenish-blue. The complexon solution is prepared following Schwarzenberg and Biedermann (*Helvetica Chim. Acta, 31, 459, [1948]*): 37.21 g. of Complexon III is dissolved in 1000 ml. of 0.2 M. $\text{NaOH}(\text{CO}_2 \text{ free})$ Solution; keep in polytene bottles to avoid corrosion of glass. Note that the pink colour appears only a few ml. before the colour change to the greenish-blue. Let b = no. of ml. employed in the titration, the result is calculated with the formula: g. SO_4 ion in 100 ml. sample = $0.0096066 (a - b)$. (II) Determination in the presence of alkaline-earth salts: Make a first titration as indicated above, but without heating and without addition of the barium chloride solution. Let a = no. of ml. of the Complexon solution employed. To another portion of 100 ml. of the solution to be examined add the barium chloride solution (b ml.) boil without filtering, and titrate with Complexon

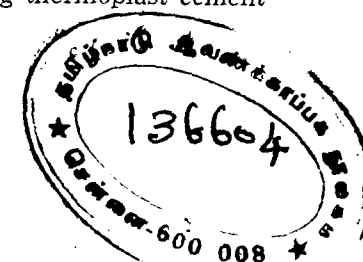
solution as above. Let c = no. of ml. of the Complexon solution employed in this second titration. The result is calculated as follows: g. SO_4 ion in 100 ml. sample = $0.0096066 (b - c + a)$.

THE FIRMNESS OF LEATHER. *E. Simoncini, Cuoio, Pelli, Mat. Concianti, 32, 390-402 (1956) Via. J.A.L.C.A., 52, 5, 283, (1957).* The firmness or rigidity of leather is defined as the resistance to deformation under the action of external forces, and it is the converse of flexibility; however the various terms of firmness, rigidity and hardness are frequently confused. The determination of rigidity may be made with an apparatus for measuring flexibility, e.g., the Olsen apparatus (cf. MacLaughlin & Theis, *Chemistry of Leather Manufacture, 1954, page 774*), and the rigidity factor is calculated with the formula $F = \frac{M.a.L.}{100 (1.S^3. h)}$ where M = Pendulum mass, L = Length of the arm, a = angle read on the scale of the moments, h = angle of bend, S = thickness of the sample, and l = breadth of the sample. With this apparatus several determinations were made on vegetable and chrome leathers, and it was shown that a previous wetting of the leather samples decreases the rigidity of the chrome leathers, while with the vegetable leathers, the action is not constant.

ESTIMATION OF SULPHITE-CELLULOSE EXTRACT IN SYNTANS. *M. P. Balfe, J.S.L.T.C., 41, 4, 118, (1957).* The cinchonidine precipitation method for determination of sulphite-cellulose extract does not give satisfactory results in the presence of syntans. It is suggested that an approximate measure of the proportion of sulphite-cellulose extract in syntans can be obtained by determination of methoxyl, assuming that the solid matter of sulphite-cellulose extract contains one-seventh of its weight of methoxyl.

FABRICATION AND MACHINERY

REVOLUTIONARY NEW MACHINE UPHOLSTER PANEL IN ONE OPERATION. *The Lea. Manfr., 74, 6, 54 (1957).* One of the greatest boons to the upholstery is a remarkable new machine designed for use in fabricating panels for automotive, aircraft, furniture and luggage industries which is being produced by Kamborian Products, Inc., 292, Main Street, Cambridge, Mass., known as 'Kamborian Edge Folder', the machine stretches material over surface of a form cementing the marginal portion to the reverse side securely in one operation. Using thermoplast cement



which is fed automatically under controlled temperature to the operating head. The Kamborian Edge Folding Machine performs complete upholstering operation as fast as material can be fed by the operation. The advantages of this machine are numerous. Uniform high quality with saving in time and labour are foremost among those listed. Successful pilot studies are being undertaken with automotive and aircraft part manufacturers, particularly in door panel work. Folding and sealing operations are made practically instantaneous by the use of patented knurled feed gears and automatic folding and cementing controls. Fast operation, uniform high quality, elimination of messy precementing operations, combined with savings in material are among the bonus benefits claimed for this machine.

THE EFFECT OF SALT CONCENTRATION ON THE BIO-CHEMICAL REACTION OF SOME HALOPHYLIC BACTERIA. N. E. Gibbons, *Canadian J. Microbiology*, 3, 2, 249 (1957). Tests with a number of stains of halophylic bacteria indicates that biochemical reactions such as protein hydrolysis and indol and hydrogen sulphide production, may vary with the concentration of salt in the medium. It is suggested therefore, that tests should be made with a series of salt concentration giving the range of growth of organisms before the negative results are reported.

— Y. N.

NEW GLUING MATERIALS FOR SHOE MANUFACTURE. B. Y. Kazanovich, *Tanner*, 12, 2, 46 (1957). The glue meant for pasting leather and cardboard counters into uppers in footwear is composed of, latex—19.4, carboxy methylcellulose—1.9; colophony—9.7; benzene—9.7 and water—57.4 parts. The carboxy methylcellulose should swell in water for 4 to 6 hrs., after which it is stirred while being heated on a water bath. The glue, heated to a temp. of 30 to 40°C, is mixed with a solution of carboxy methylcellulose; latex heated to a temp. of 30°C, is then added to the mixture and a 50% solution of colophony in benzene is added. The film of the glue so prepared is applied on uppers is dried for 30 minutes at 50°C, after which the film is coated with acetone or ethylacetate, and the shoes are pressed in for 10 to 15 minutes in the glue.

THE TECHNICAL CHARACTERISTICS OF CHAMOIS LEATHERS FOR CLEANING AND FILTERING PURPOSES, AND PARTICULARLY OF THOSE PRODUCED FROM THE

SKINS OF CHAMOIS (*Rupicapra Europaea* L.), R. Airolidi. *Ann. Chimica*, 45, 517-525 (1955). *Via. J.A.L.C.A.*, 52, 5, 282, (1957). Degrained sheep skins tanned with marine oils are commonly called "Chamois leathers". The most important specifications for these leathers are (values calculated on dry basis): ash max. 5%; fatty matter (extraction with CHCl_3 , or successive extractions with petroleum ether and a mixture of ethanol and ethyl ether) max. 5%; water-soluble matter (at 45°C.) after the fat extraction) max. 1%; pH (2g. leather in 100 ml. H_2O) 3.5-8.0, and max. difference index 0.7 if the pH is less than 4.5; shrinkage temperature min. 60°C.; tensile strength min. 1 kg. per sq. mm. section; stretch min. 40%; water absorption min. 130% in 5 min. and 170% in 30 min. The filtration test is made by filtering gasoline mixed with 5% water through a leather disc of 20 cm. diameter; at least 750 ml. gasoline should pass through the filter before the first drop of water. It was sometimes affirmed that the chamois leather obtained from the skins of the "true" chamois (the antelope) is better than that obtained from the skins of other animals, particularly goat and sheep skins. Approximately 1 million chamois (animals) live in Europe and not more than 50,000 skins yearly are tanned (as chamois leather); generally these skins are very poor, with scars and various alterations. Some experiments were made with skins of chamois, goat and sheep, tanned in the same way with cod-liver oil; the chamois and goat skins absorb oil more slowly than the sheepskins. The leathers were analysed with the standard methods, and the results showed no difference in the three different types. A sure identification of the "true" chamois skin appears to be possible neither by chemical analyses nor by microscopical examination. Taking into account the observed results, the preference for "true" chamois leathers over those obtained from goat or sheep skins is not justified.

THE EVALUATION OF TANNERY WASTES.—Mark M. Luckens. *J.A.L.C.A.*, 52, 5, 260 (1957). Before deciding on any method or process for treating tannery wastes, a survey must be conducted to determine the amount and characteristics of the total effluent and of the portions of the effluent originating in each tannery operation. Of equal importance is a survey of the receiving stream to determine the effect of the effluent on the stream, since the amount and character of treatment required are determined by the difference between the total effluent on the stream, since the amount and character of treatment required are determined by the difference between the total pollutional potential of

the effluent and that which the receiving stream can tolerate without impairment of its over-all value to the community. Methods for conducting such a survey are described.

A STUDY OF THE MECHANISM OF FATTY SPUE FORMATION. I. R. G. Mitton and K. G. A. Pankhurst, *J.S.L.T.C.* **41**, 4, 128, 1957. Attempts to solve the problem of fatty spue formation, in the past have been almost exclusively confined to a search for the perfect fatliquor. Experience, however, has shown that while the choice of fatliquor is important, it is by no means the only factor to be considered. It is often found that firms producing a similar type of leather, and using the same fatliquor, experience fatty spue formation to different extents. This has led to a mass of contradictory reports on the subject, for which any satisfactory theory must account. The present laboratory work was undertaken to discover the method by which fatty materials migrate through leather, and to see how far this can be regulated by the normal operations of leather manufacture. It has been found that solid triglycerides and solid fatty acids can migrate from one surface of a piece of leather to the other, and if applied to the flesh side can appear in the course of time on the grain surface in a crystalline form which would undoubtedly be termed "spue" by the industry. The conditions under which this migration takes place depend on the nature of the fatty material; triglycerides spue when the temperature is relatively high (40°C. for tristearin) especially in dry atmospheres; fatty acids on the other hand migrate and appear as spue at temperatures lower than 20°C., particularly at high relative humidities. Thus it is possible for a skin to show spue when stored at low temperatures, to lose it temporarily when the temperature is raised, and then for the spue to reappear at the higher temperature. Fat is considered to migrate as a unimolecular layer on the fibres—the fat spreading over the surface in much the same way as it would spread over a water surface. The nature of the surface of the fibres is therefore important, and the various pre- and post-tanning operations have been studied to discover their influence on migration. As might be expected, the type of tanning is important; vegetable leather being far less likely to spue than chrome leather. With chrome leather, however, the final basification level is important; so is mordanting and dyeing. Tentative suggestions are made for alleviating spue on chrome leather, and further work is outlined.

NOTES & NEWS

NEW U.S. FINISH ADHESION TEST. *Lea. Tr. Rev.*, **124**, 3706, 91 (1957). A test has been developed at the Battelle Institute in the U.S. for measuring the adhesion of finish to leather which gives results independent of other finish properties such as elasticity and flexibility. In the test, a copper strip is bonded to the leather finish by means of a heat activated phenolic film (or bonding film). The force required to remove the copper strip, bonding film, and vertically from the leather surface is determined by conventional tensile-test apparatus. The 'Bonding Film Adhesion Test' has been applied to a variety of leathers, the finishes on kid leathers show very low adhesion values, cow hide shoe upper leathers show intermediate values, and upholstery leathers show high values. Within prescribed limits, variation of temp., pressure and dwell time during preparation of the specimens do not significantly affect the adhesion values obtained. There are some kinds of finishes to which the presently available bonding film will not adhere satisfactorily.

A NEW METHOD OF KID LEATHER SHRINKING. *Lea. Tr. Rev.*, **124**, 3708, 186, (1957). A new method of shrinking has been devised by Wade & Co., Ltd., Nottingham. The result is a very smartly finished leather with a distinctive crinkly texture. The new kid is called 'Broadtail', and it is claimed to have long wearing qualities. As a result of shrinking process, the skin is reduced in area by almost 50 per cent but several outstanding qualities are imparted to the leather. Foremost amongst these is resistance to scratching. Although soft and pleasant to touch the leather has resilience and toughness which gives long life and will enable shoes to retain their appearance over a longer period. Shoe and accessory manufactures have already taken up the leather is now produced in fifteen colours. 'Broadtail' has been designed for fashion and particularly suitable for dress shoe. Manufacturers have found that the leather lends itself to the pointed shoe designs. The leather has already been made up for belts and handbags.

ANTI-STAIN SUEDE. *Shoe and Lea. Rep.*, 285, 6, 40 (1957). New treatment to make suede leather water-resistance, can be applied in drum during wet processing of skins, following tanning and is said to substantially reduce fatliquoring step. Weight added by treatment is said to be only 3% as against 4-8% in ordinary processing. Stain repeller is "Scotchgard", produced by Minnesota Mining & Mfg. Co., St. Paul, Minn. While permits leather to "breathe", it also aids dye-fixing and gives added softness for dry cleanability. Also resists salts of Perspiration according to the firm.

WASHABLE WHITE LEATHER. *Shoe and Lea. Rep.*, 285, 5, 38 (1957). The Brezner Division of Allied Kid Co., Boston, has developed a washable white leather called "Cobble-White". It is tanned to resist cracking and splitting, and the company states it will stand up against hard-duty wear.

First co-operative tannery in U.P.

The first co-operative tannery ever to be established with a State government as a major partner, has been set up at Mohamedabad in Uttar Pradesh. The Rs. 200,000 project was first mooted by the Planning, Research and Action Institute of Lucknow to be run on a co-operative basis by the leather workers of 15 villages in the Farukhabad district. As it was beyond the means of the rural leather workers to finance the whole project, the State Government's participation and financial assistance was sought. The tannery, registered as a private limited company, has three shareholders. Eighty per cent of the shares are held by the Government, while 20 per cent each by the Leather Workers' Co-operative Society and the District Co-operative Federation. The Leather Workers' Co-operative Society was organised by the Planning, Research and Action Institute. The tannery is expected to produce high quality leather at competitive rates. The All-India Co-operative Union is watching the experiment with keen interest, as a successful working of the factory may pave the way for co-operative enterprises covering wider spheres of large-scale industries.

—*Evening News*, Bombay, dated 11th May, 1957.

Footwear unit at Erode proposed

A model footwear and leather goods unit is likely to be established soon at Erode under the All India Small Scale Industries Board in the Lower Bhavani Pilot Project area with a grant of Rs. 8,433 and loan of Rs. 73,864 from the Government of India.

—*The Hindu*, Madras, dated 17th May, 1957.

Industries for Himachal

A survey team of the Government of India would be visiting Sundernagar project area in Himachal Pradesh shortly for a detailed survey to assess industrial potential of the area. Sundernagar area was ideally suited for the development of leather goods industry. Besides the availability of necessary raw material, other economic factors were also favourable for its establishment. Out of some 5,000 cobbler population of Himachal about 16 per cent are concentrated in the Balh Valley in Mandi District. Government of India would be providing financial and technical assistance for the establishment of industry. Flaying and processing of leather will be undertaken to improve the quality of finished goods. Foot-wear manufacture will be given importance. Besides leather goods, wool and woollen-products industry is being organised in Himachal Pradesh on scientific and sound economic basis. There are about 6.5 lakh sheep in Himachal and now efforts are afoot to improve their breed by importing good quality rams from Australia.

—*Hind. Stand.*, Delhi, dated 27th May, 1957.

Rs. 1,70,000 scheme for Village Tanneries in Punjab

The Punjab Government has decided to establish ten co-operative village tanneries in the State, in the current financial year at a cost of Rs. 1,70,000. It is also proposed to organise 271 co-operatives of shoe-makers at a cost of Rs. 2,85,000 during the year.

—*Tribune*, Ambala, dated 10th June, 1957.

Animal hides project to be launched

The Planning Action and Research Institute of the U.P. Government is shortly launching a pilot project in tanning and curing of hides of forest animals in one of the NES blocks on the Indo-Tibetan border, it is learnt. It is known that there is a great

demand in foreign countries, particularly in the United States, for hides of animals like fox, for the manufacture of ladies' coats and hand bags. If the project proves successful, it will not only earn appreciable foreign exchange for the country, but also help in the improvement of the condition of the economically backward people of the border areas.

—*National Herald*, Lucknow, dated 6th June, 1957.

Leather Finishing Service Centre

The Leather Finishing Service Centre which the Madras Government propose to set up at Ambur at a cost of Rs. 4.5 lakhs is expected to go into operation in about six months' time, it is learnt. Enquiries indicate that necessary buildings for housing the centre are being erected and the required machinery has been ordered for. The object of the centre is, it is stated, to help the tanners to give a final finish to the half-tanned leather. At present, half-tanned leather is being exported for a lower price since tanners have no facility for full tanning. The centre would undertake the work of full tanning at a nominal charge. Machinery for this service centre is expected to cost about Rs. 2 lakhs. A cold storage plant will also be provided to enable tanners to deposit their raw hides on a nominal charge, in order to prevent decomposition.

—*The Hindu*, Madras, dated 29th June 1957.

Standards Institution Branch set up

The Indian Standards Institution has set up a branch office at Madras, for the benefit of the industries located in the southern region. This branch will disseminate information to the industry regarding standardisation and advise those engaged in industry and commerce in implementing and adopting Indian Standards, and will also conduct technical enquiries to give preliminary instructions in connection with ISI Certification Marks Scheme. Its stock of India, British, American and IEC Standards will be made available to the public either for reference or for sale. The Indian Standards Institution Branch which is located at No. 23, Nungambakkam High Road, will also interest itself in the forming of Standards Departments in local industries, if required.

—*The Hindu*, Madras, dated 22nd June 1957.

Export of Bone Sinews

It has been decided to continue the existing free licensing policy regarding export of bone sinews and other glue making materials to permissible destinations, excluding the Portuguese possessions in India, the Assistant Controller of Exports, Amritsar, notified on 22nd June 1957. Free licensing will be in force for shipment upto the end of December 1957. Shippers are however warned that they should not in their own interest enter into commitments with foreign buyers for exports beyond December 1957, as free exports may not be sanctioned after that date, the notification added.

Another notification said that crushed bones and bone grist allotments would be granted for July-December 1957 to those established shippers and crushers who were given quotas for January-June 1957. Crushing mills not eligible now but which might start production would also be granted allotments equivalent to 100 per cent of their production.

—*Indian Express*, Madras, dated 25th June 1957.

Russia buys Indian shoes

About 3,200 pairs of shoes out of the 18,000 pairs ordered by Russia would be delivered to Russian officials.

Russia had entered into an agreement with the Government of India to purchase two lakh pairs of shoes. Of these, 18,000 are to be made in Hyderabad. The shoes have been manufactured by small-scale units and will be delivered through the National Small industries Corporation. The price per pair ranges between Rs. 11 and Rs. 22.

—*Hind. Times*, Delhi, dated 13th May 1957.

Leather Exports to New Zealand.

Mr. S. K. Chowdry, First Secretary-designate (Commercial) to the High Commission of India, Wellington, New Zealand, met Mr. R. K. Rangan, Joint Chief Controller of Imports and Exports, and Chairman of the Leather Export Promotion Council, Mr. M. J. Jamal Moideen, Vice-Chairman and members of the Council on June 24 and discussed with them matters relating to trade expansion between the two countries with particular reference to

leather. The Council acquainted Mr. Chowdry of the possibilities of exporting finished leather and leather manufactures to New Zealand and explained to him that high quality wattle bark used in the tanning industry was grown on a commercial scale both in Australia and New Zealand and urged him to find out from the respective Governments whether the commodity could be made available to India by those countries. Mr. Chowdry assured the Council that he would do his best to promote trade between India and New Zealand.

—The Hindu, Madras, dated 29th June 1957.

Footwear-Cum-Production Centres in Madras

The Government of Madras are taking steps to set up three footwear training-cum-production centres at Pallavaram, Salem and Madurai, a model footwear and leather-goods unit at Erode. The Government has started a footwear unit at Gandhigram and a chappal unit at Ero

—The Hindu, Madras, dated 2nd July 1957.

C. L. R. I. NEWS

Practical Demonstration No. 6, the process for the manufacture of Box and Willow Sides has been successfully completed.

Practical Demonstration No. 7, the processes for the manufacture of East India kips using Karada and Konnam, and Rapid tannage of E. I. Skins has been started on 8th August, 1957.

Dr. Y. Nayudamma, Assistant Director-in-Charge, Central Leather Research Institute, attended the meeting of the Planning and Scientific Committee of The All India Kadi and Village Industries Commission at Wardha during 23rd and 24th July 1957.

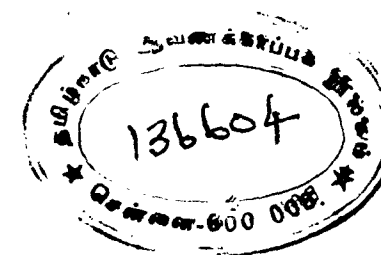
Dr. Y. Nayudamma, Assistant Director-in-Charge, Central Leather Research Institute, visited Tiruchirapalli on 2nd August 1957 to inaugurate the Science Association, St. Joseph's College, Tiruchirapalli and to meet the tanners of the district.

We welcome the following who are appointed in the Scheme of Indian Council of Agricultural Research.

1. Mr. S. P. Singaram, Junior Scientific Assistant (Chrome Retan.).
2. Mr. K. R. V. Thampuran, Junior Scientific Assistant (Mineral tannage).
3. Mr. V. V. Muralidhara Rao, Junior Scientific Assistant, (Fatliquors).

VISITORS

Name	Date of visit.
Trainees from Small Industries Service Institute, Madras with Mr. M. N. Sayeed, Junior Field Officer	18-7-1957.
Mr. Kenneth V. Thimman, Professor of Biology, Harvard University, Mass. U.S.A.	22-7-1957.
Mr. T. S. Sadasivan, Professor of Botany, Madras University	22-7-1957.
Mr. G. R. Rao, Hyderabad	1-8-1957.
Mr. Y. Papiiah, Vice-Principal, St. Joseph's College, Tiruchirapalli	6-8-1957.
Mr. M. R. Thandani, First Secretary-designate, Embassy of India in Sudan	9-8-1957.



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