

355

Bulletin of the

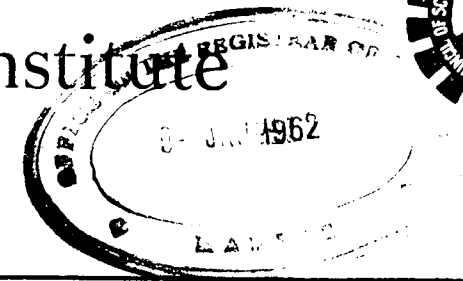
CLRI, Madras

OU- 1961

52
m97, dm 211m, m94

N61-8-3
136637

Bulletin of
The Central Leather
Research Institute
Madras

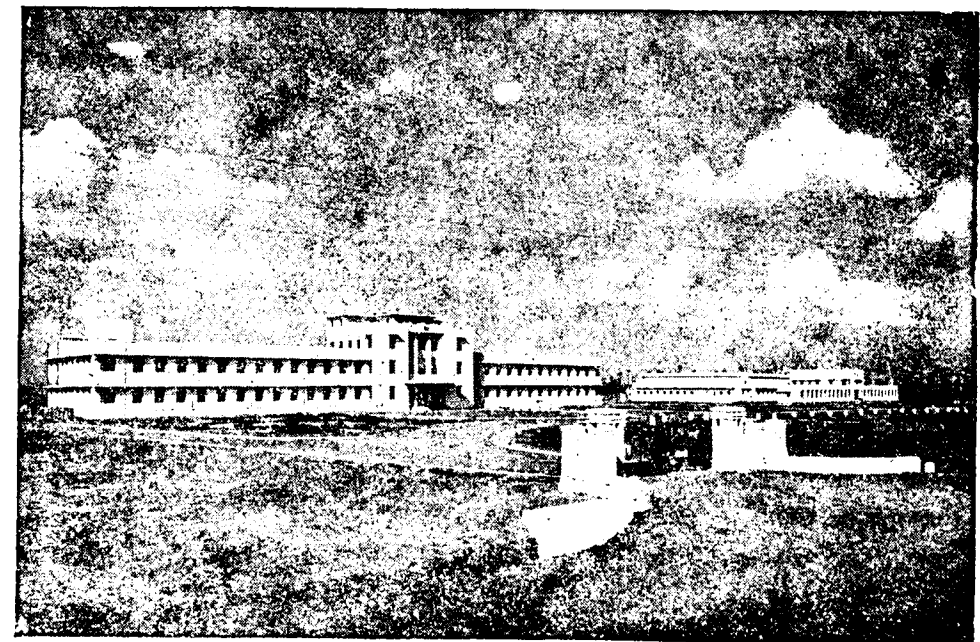


Vol. VIII

OCTOBER, 1961

No. 3

355



COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH
INDIA

Bull. cent. Leath. Res. Inst., Vol. 8, No. 3, Pp. 101-152, Madras, October, 1961

Bulletin of The Central Leather Research Institute

Vol. VIII

OCTOBER, 1961

No. 3

CONTENTS

The effect of Tanning Agents on the Optical Birefringence of Collagen B. C. Basu, N. Ramanathan & Y. Nayudamma ..	101
Research Bears Fruit—Rapid sole leather tannage by vegetable-chrome-vegetable combination tannage —A. Ganesan & T. Vijayaramayya ..	123
Research Bears Fruit — Vegetable-chrome-vegetable combination tannage as a substitute for bag tanning — W. N. Pandav & A. Ganesan ..	127
Letters to the Editor :	
(1) Studies on biosynthesis of tannins in indigenous plants. Part V: Occurrence of a flavan-3:4-diol in pithecolobium dulce—S. Rajadurai ..	130
(2) Studies on biosynthesis of tannins in indigenous plants. Part VI: Isolation of quercetin from the heartwood of dhawa —K. K. Reddy, et al ..	132
Technical Seminars :	
(1) Water-proofing of sole leather—P. L. Muthiah ..	133
(2) Myrobalan as a self tanning material—K. J. Kedlaya ..	134
Tanners' Corner ..	135
Classified Abstracts ..	137
Notes & News ..	143
C.L.R.I. News ..	150

Editorial Board:

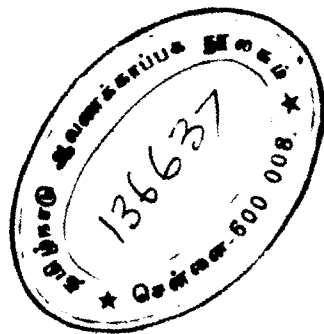
Dr. Y. NAYUDAMMA (*Editor*)
Dr. V. S. PADMANABHAN (*Managing Editor*)
Dr. S. K. BARAT
Dr. S. N. SEN
Mr. M. A. GHANI
Mr. N. SUBRAMANIAN (*Secretary*)

Annual Subscription.—Rs. 9/- (inland); Rs. 18/- (foreign); Single Copy 75 nP.

The Bulletin of the Central Leather Research Institute is issued monthly.

Communications regarding contributions for publication in the Bulletin books for review, subscriptions and advertisements should be made to the Managing Editor, C. L. R. I., Madras-20.

All remittances by cheque or money order should be made payable to the Director, Central Leather Research Institute.





A wattle extract
of consistent
high quality
and low colour

Made from selected
Mimosa Wattle Bark

Distributed in India by

RALLIS INDIA LIMITED
BOMBAY MADRAS CALCUTTA

**QUALITY
LEATHER
FINISHES**

**PIGMENT FINISHES
RESIN FINISHES
SOLE POLISHES
BINDERS & AUXILIARIES**

HANDYMEN INDUSTRIES PRIVATE LTD
PHONE: 86871 161 MOUNT ROAD MADRAS-2 INDIA GRAMS: REPTILES
Aiyars.

THE EFFECT OF TANNING AGENTS ON THE OPTICAL BIREFRINGENCE OF COLLAGEN*

BY

B. C. BASU, N. RAMANATHAN & Y. NAYUDAMMA
Central Leather Research Institute, Madras

Received on May 5, 1961

SUMMARY

This study has shown that all the pyrogallol type tanning materials investigated effect a reversal in the sign of birefringence (b.r.) of collagen fibres. Some of the catechol type tanning materials do the same but the change in sign is not very prominent. Negatively birefringent crystals were observed in those tan liquors which brought about the reversal in the sign. This was confirmed by separating the crystals (non-tans) from the tan liquor by dialysis and treating the fibres with the dialysates. The anisotropic crystals found in liquors of hydrolysable tanning materials were strongly negative with respect to their long axis, while those in liquors of the condensed type were only weakly negative. On increasing the pH of the liquor to values above 7, the anisotropic crystals became isotropic and fibres treated with tan liquors at these higher pH values did not exhibit negativity. On heating also, the anisotropic crystals lost their negative b.r. and regained it after exposure to moisture. Collagen fibres treated with these non-tans became positively birefringent when they were heated and regained their negativity on cooling. The higher the concentration of these crystals in the tan liquor, the more prominent was the conversion to negativity. These experiments confirm that the negatively birefringent crystals found in the tan liquors are causing the reversal in the optical sign. X-ray diffraction studies revealed that no macrocrystals were present in the free state in the treated fibres. Since an alteration of the collagen X-ray pattern has been observed, the change in the sign of b.r. is probably caused by a molecular interaction between collagen and the negatively birefringent crystals.

Paper chromatography of the dialysates obtained from the tan liquors of myrobalan and gambier revealed spots identical to those given by gallic acid and catechin respectively. The gallic acid and catechin crystals in the tan liquors probably effect the reversal in

*Based on the thesis of Shri B. C. Basu which was awarded the Ph.D. degree of the University of Madras.

the optical sign of collagen. On the basis of this study, vegetable tanstuffs are classified into five groups depending on the amount and the nature of the b.r. of the crystals found in the dialysates of their liquors.

Introduction

Polarisation optics has found a vast field of application in the study of fibres in general. Comparatively only a little work has been done on the birefringent properties of collagen and leather fibres. Available literature¹⁻⁶ reveals that collagen fibres are normally positively birefringent and that treatment with certain tanning materials or chemicals converts the fibre into a negatively birefringent one. Though attempts have been made to explain the reversal of the sign of birefringence (b.r.), extended investigations to determine the causes of this phenomenon are lacking. It is the purpose of this paper and the succeeding ones to report the results of detailed work on this problem and to relate, as far as possible, the nature of b.r. of the fibres with the nature of the tanning materials used on the one hand and with other properties of the fibres and leather such as shrinkage temperature on the other.

Collagen fibres occur in bundles and it is difficult to isolate what may be termed a 'single fibre'. As the determination of b.r. involves the material thickness of the sample, it is difficult to obtain reliable quantitative data on b.r. Hence only the sign of the b.r. is stated in the results. It is possible, however, to distinguish between strong and weak b.r. by observing the brightness of the fibre between crossed nicols. For convenience of presentation, the paper is divided into three parts.

PART I

Materials and Methods

Source and preparation of fibres:

(A) *Fibres from buffalo cheek:* A piece of wet salted hide from the cheek of a slaughtered buffalo was washed thoroughly in running water and hand-fleshed. Then it was acetone dehydrated in five changes of acetone over a period of two days and dried in the laboratory conditions of $80^{\circ}\text{F} \pm 4^{\circ}$ temperature and $65\% \pm 2\%$ relative humidity. A small piece of the stock was wetted back in distilled water overnight; the fibre bundles were teased out and redried by dipping in acetone. The teased out fibre bundles obtained were 1.0–1.5 cm. in length and wavy in nature.

(B) *Kangaroo tail tendon (K.T.T.):* Samples of K.T.T. fibres were obtained from the Australian Leather Research Association. The source and details of treatment given by them are as follows:

- (i) Excised from the tail of a kangaroo, dead 26 hours.
- (ii) Extracted for 3 days in 3 changes of 7% aqueous solution of sodium chloride.
- (iii) Dehydrated with acetone.
- (iv) Extracted with ether.

Fibre bundles of kangaroo tail tendon were, to some extent, straight and long.

Technique of observing the b.r. of fibres:

The limed, delimed and dehydrated fibre bundles, both from buffalo cheek and kangaroo tail tendon, were fixed on micro-slides. The method was to scratch two lines, 1 cm. apart, on the micro-slide by a diamond point in order to attach a fibre bundle (in the stretched condition) at its ends with the help of Durofix. The adhesive does not hold the fibre bundle in tension when the slide surface is smooth and wet. The fibre bundle along with the micro-slide was immersed in solutions for pretanning and tanning treatments. Sometimes only a few drops of tanning solution were used to cover the fibre bundle. The optical change, if any, in the fibre bundle in the wet stage or after drying was observed using a polarising microscope and a first order red plate. The experiments were conducted in a laboratory having atmospheric conditions of $80^{\circ}\text{F} \pm 4^{\circ}$ temperature and $65\% \pm 2\%$ R.H. Fibre bundles teased out of commercially tanned leather were also examined. This included leathers tanned with cationic chrome liquor and basic aluminium sulphate liquor.

Data and Discussion

The findings are recorded in Tables 1 and 2. It is observed from Table 1 that some of the vegetable tanning materials reverse the sign of the b.r. of collagen fibre. In the case of formaldehyde, the original positivity of the collagen fibre appeared to be maintained. With anionic chrome liquor, the collagen fibre was covered partially with big birefringent crystals but the sign of b.r. of the collagen fibre was not altered. The same characteristics were observed with aluminium, zirconium and lignosulfonate. In the case of cationic chrome tanned fibre, the colour of the fibre was slightly reduced in intensity most probably due to the colour of

the chrome liquor. No anisotropic crystals were seen on this fibre. Fibres tanned with some condensed type vegetable tannins, syntan etc. maintained their original sign, though the original colour intensity was reduced. Highly coloured tanning materials, having appreciable quantity of insoluble matters, e.g., cutch, mangrove etc. rendered the fibre opaque (the fibre appearing to have been painted or coated with a film). This is most probably due to deposition of coloured, insoluble matters⁷ on the fibre surface, so that light does not pass through it; hence its double refraction is not observable. It is seen from Table 1 that the hydrolysable type tanning materials, except valonia, reverse the optical sign of the collagen fibre. It is interesting to note that the extracted liquor of valonia acorn can change the optical sign, though its tan content⁸ is far less than that of cup and beard. Hence, it would appear that the tannin is not responsible for this optical change.

As regards the condensed type tanning materials, it is observed that some of them (e.g., gambier, 'kattha,' avaram and konnam) can bring about a change in the optical sign of collagen fibre, though the change is not so sharp as that observed with the hydrolysable type tanning materials. Further, cutch (*Acacia catechu*) does not cause a reversal in optical sign but 'kattha' does. It is known⁹ that cutch consists mainly of catechu-tannin and only a little of catechin, while pale catechu or 'kattha' consists mainly of catechin, and only a little of catechu-tannin. Hence, the quantity of catechin seems to influence the optical sign of collagen. The change obtained with gambier is most probably due to presence of a good amount of catechin. At this stage, it is not possible to say which of the components of avaram and konnam tan-liquors are responsible for the optical change of collagen fibre as their chemical compositions are not known. As regards the other tanning materials of condensed type where the reversal was not observed, it may be assumed that substances like catechin are negligible in quantity or absent in them.

It is also observed that the change caused by the mixed type tanning materials (e.g. babul) is not prominent when compared to that brought about by hydrolysable type tanning materials. The change caused by tea-leaf is probably due to presence of gallo-catechin, catechin etc.¹⁰ It may be assumed that the substances which are responsible for the reversal of the sign may be present only in small quantities in the mixed type tanning materials. Hence, the mixed type does not change the sign to a great extent.

It was also found that the optical sign of collagen, tanned commercially with mineral tanning agents, formaldehyde, or oil is not altered and this confirms the findings reported in Table 1. In the case of chrome retan leather, the optical sign was found to depend on the nature and quantity of vegetable tanning materials used for retanning.

TABLE 1
Showing the effect of different tanning agents on the optical properties of collagen fibre

S. No.	Tanning agents	Nature of tannin	Nature of b.r. of tanned fibre after drying
0.	—	—	Positive
1.	Chrome liquor	Cationic	"
2.	"	Anionic	"
3.	Aluminium sulphate	33% basic	"
4.	"	66% basic	"
5.	Zirconium sulphate	Basic	"
6.	Formaldehyde	pH adjusted at 8	355 "
7.	Novolak type syntan	—	"
8.	Neradol type syntan	—	"
9.	Lignosulphonate	—	"
10.	Immergan	—	"
11.	Oxidised fish oil	—	"
12.	Valonia cups (containing beard)	Hydrolysable	"
13.	Acorn of valonia	"	Negative (strong)
14.	Myrobalan nut	"	"
15.	Sumach leaf	"	"
16.	Dhawa leaf	"	"
17.	Divi-divi pod	"	"
18.	Babul bark	Mixed	Negative (weak)
19.	Chestnut extract	"	"
20.	Gambier extract	Condensed	"
21.	Kattha extract	"	"
22.	Mimosa extract	"	Positive
23.	Quebracho extract	"	"
24.	Mangrove cutch extract	"	"
25.	Cutch extract (<i>Acacia catechu</i>)	"	"
26.	Avaram bark	"	Negative (very weak)
27.	Konnam bark	"	"
28.	Wattle bark (Nilgiris)	"	Positive
29.	Tea leaf	"	Negative (weak)
30.	Goran bark	"	Positive

Collagen fibres were also treated with different concentrations of hydrolysable tan liquors, keeping the time constant, and for different time intervals keeping the concentration constant. It was found that the negative b.r. became more prominent with increasing time or concentration. The optical sign is affected by the duration of tannage as well as by the concentration of tanning liquors. Also the hydrolysable type tanning materials have a greater ability to reverse the sign than the condensed type ones and the mixed type (babul for instance) is not so effective as the hydrolysable type nor is it as ineffective as the condensed type. Further, the reversal in sign in the wet state of the fibre is somewhat feeble; but after drying it is strong. The difference in the concentration of the substances (responsible for this optical change), in the wet and dry conditions of the fibre may be influencing the strength of the reversal. Experiments with tan liquors containing hydrolysable and condensed types in varying proportions indicated (table 2) that the reversal in the sign became stronger with the increase in the content of the hydrolysable type in the blend. This makes it possible to know which of the two types is used in predominant quantity in any commercial leathers.

TABLE 2

Showing the optical properties of collagen fibre due to blend tannage for 24 hours in myrobalan and mimosa extract solution.

Ratio of		Volume of liquor	Birefringence	
myrobalan	mimosa		in wet stage	after drying
1	1	100 ml.	Negative	Negative
1	2	"	Isotropic	"
1	3	"	Positive	Weakly negative
1	4	"	"	Isotropic
1	5	"	"	Positive

Next, extracts of various tanning materials were examined in the polarising microscope. Among others, elongated and fine birefringent crystals were found in myrobalans, sumach, chestnut, kattha, gambier, dhawa leaf and divi-divi pod. No crystals were found in cutch, quebracho, mimosa, syntan and basic chrome liquors.

Marriott⁴ observed that there was no reversal of sign when collagen was tanned with chestnut-extract. The present authors have, however, found that when a collagen fibre is tanned with a concentrated chestnut liquor, a reversal of sign is obtained. Marriott also found that mimosa and gambier reversed the sign but in the present experiments, reversal was caused by gambier only and not by mimosa, probably due to the presence of a sufficient quantity of negatively birefringent crystals, in the case of the former.

It is to be noted that the crystals observed in the case of gambier and 'kattha' disappear on dilution or heating but this is not the case with the crystals found in hydrolysable or mixed type tanning materials, because these crystals are insoluble in water. They have characteristics similar to ellagic acid crystals, occurring in myrobalan-bloom.

PART II

It has been stated in Part I that crystals varying in size and shape were found in tan liquors and that these non-tans brought about the reversal in the sign of b.r. of collagen fibres. It became necessary to separate the crystals and see if they could by themselves cause the reversal. Promising results in separating the non-tans from the tanning acids have been obtained¹¹ by means of dialysis through smoke tanned collagen membranes, marketed under the name of "Naturin". The tanning acids and their salts have been found to be retained by this membrane while non-tanning acids and their salts are found in the dialysate. A non-tanning acid has been regarded as a compound which does not give a precipitate with the gelatin-salt reagent.

Materials and Methods

'Naturin' (i.e., the membrane) was fixed with the help of a rubber-ring and collodion solution around the mouth of a glass-funnel to prevent leakage of tan-liquor sideways. A small quantity (20 ml.) of each of the concentrated tan liquors (50°Bk) was taken separately inside the glass-funnel and then it was suspended for 24 hours over distilled water (50 ml.) in a petri-dish. A few drops of the dialysate so obtained, were placed on a micro-slide to cover the fibre bundle which was mounted under slight tension and then the dialysate was allowed to dry. After complete drying, the dialysate and the treated collagen fibre bundle were examined in the polarising microscope.

In order to study the effect of pH, the tan-liquors and the dialysates obtained from myrobalan (hydrolysable), babul (mixed) and gambier (condensed) were collected separately. The pH of each solution was adjusted from 2 to 9 with the addition of hydrochloric acid or sodium hydroxide. A few drops of the liquor in each pH range were placed on the fibre bundle which was under tension. The optical changes which occurred in the fibre bundle as well as the anisotropic crystals formed after complete drying were examined.

Data and Discussion

The results are presented in Table 3. It is known that colloidal material in solution may affect crystal habit very markedly and in some cases may completely prevent normal development¹². Tannins are colloidal in nature; hence in the presence of tannin, no prominent crystal was observed whereas the tannin-free dialysate exhibited well formed crystals. The pH of the dialysate obtained from hydrolysable tanning materials is less; this indicates the presence of more non-tanning acids. The dialysate contains only non-tans (i.e., acids, salts and smaller sized phenols) because it is not precipitated by gelatin-salt solution. The dialysates obtained from the different tan-liquors react with iron-alum solution to form different colours, e.g., the dialysate obtained from hydrolysable or mixed type tanning material gives a blue colour whereas the dialysate from condensed tannin gives a green colour. This colour indicates the presence of different phenolic substances.

It is evident from table 3 that the tanning materials which can change the optical sign of collagen, yield crystals in the dialysate which are to some extent similar in shape, i.e., elongated and negatively birefringent with respect to their long axis. The dialysate of hydrolysable tanning materials, e.g., myrobalan and divi-divi, showed maximum amount of the elongated crystals, the crystals being very bright (i.e., strongly negative) under crossed nicols; those from condensed ones were not so bright (i.e. were weakly negative) and the quantity was also not much except in gambier and kattha. The crystals obtained from chestnut and babul appeared to be bright but the quantity was less in comparison with hydrolysable tanning materials; those from tea leaf were not so bright and the quantity was small. It would seem that the elongated crystals obtained from a particular class of tannin (e.g., hydrolysable or condensed) are similar in nature to some extent though the concentration of crystals may vary from sample to sample. The dialysate, having isotropic crystals or anisotropic crystals

not of the elongated shape, is not in a position to change the optical sign, although it can suppress the positivity of the collagen fibre.

It has been observed earlier that quebracho extract, aqueous extraction of wattle bark or valonia cup could not cause reversal whereas the concentrated dialysate obtained from the same tanning materials could change the optical sign. Hence the concentration of some specific non-tan constituents of these may bring about this change.

It was observed that with the progressive removal of non-tans by dialysis, the power of reversing the optical sign by tan-liquor was decreased. In the case of the condensed type tanning materials, the reversing power is lost easily by the removal of non-tans; in the case of hydrolysable tannin, the reversing power is not easily lost. It is known that the weak spots in the hydrolysable tannins are their ester linkages. It is at these that the cleavage processes start leading to decomposition of the original tannin into its structural units. These units are no longer tannins in the actual sense of the term, but are already decomposition products. These products are formed by auto-hydrolysis and splitting is induced by mould-growth. Hence in the case of hydrolysable tannins, the non-tans are removed by dialysis but they are also continually formed from the tannins due to hydrolysis. It is interesting to note that no crystals are visible in a freshly prepared highly concentrated myrobalan liquor but they appear in large quantities in the same liquor after ageing for four months. This indicates that the tannin is progressively converted to crystalline non-tans.

It is further observed that all the dialysates except those of goran and mangrove cutch can change the optical sign of collagen fibres. Goran and mangrove cutch do not contain any anisotropic crystals and this explains their inability to reverse the sign.

Results of experiments at different pH values show that tan-liquors, having a pH value of 7 or above, are unable to reverse the optical sign; at these pH values, anisotropic crystals are not seen.

Also, the pH of the dialysate from vegetable tan-liquors governs the optical sign of the collagen fibre, i.e., at pH 7, the collagen fibre bundle is either isotropic or positive, above pH 7, it is always positive and below pH 7, it is always negative. With the increase of pH value, the amount of anisotropic crystals is reduced gradually and the ability of the dialysate to reverse the optical sign

TABLE 3

Showing the characteristics of dialysates obtained from different tanning agents

S.No.	Tanning agents	pH of dialysate	Colouration with iron-alum solution	Nature of birefringence of crystals after drying	Birefringence of fibre treated with dialysate (after drying)	Remarks
1.	Chrome liquor (basic)	2.75	—	Only isotropic crystals	Positive	
2.	Novolak syntan	3.5	—	Irregular big anisotropic crystals	"	
3.	Myrobalan nut	3.4	Blue	Very large amount of elongated, negative, anisotropic crystals	Negative	
4.	Divi-divi pod	3.5	"	" "	"	
5.	Sumach leaf	4.2	"	Large amount of elongated, negative, anisotropic crystals	"	
6.	Dhawa leaf	4.0	"	" "	"	
7.	Valonia cup (containing beard)	3.8	"	Very small amount of elongated, negative, anisotropic crystals	Negative with concentrated dialysate	
8.	Acorn of valonia	3.6	"	Large amount of elongated, negative, anisotropic crystals	Negative	
9.	Gambier extract	6.0	Green	Elongated, negative, anisotropic crystals	Negative	
10.	Kattha extract	5.9	"	" "	"	
11.	Avaram bark	4.8	"	Small amount of elongated, negative, anisotropic crystals	"	Large amount of isotropic crystals
12.	Konnam bark	6.0	"	Very small amount of elongated, negative, anisotropic crystals	Negative with concentrated dialysate	
13.	Quebracho extract	5.5	"	" "	"	
14.	Mimosa extract	5.0	"	" "	"	
15.	Cutch extract (<i>Acacia catechu</i>)	5.5	"	" "	"	
16.	Mangrove cutch extract	5.8	"	Practically no anisotropic crystals	Positive	Large amount of isotropic crystals probably NaCl
17.	Goran bark	4.5	"	" "	"	
18.	Babul bark	4.4	Blue	Medium amount of elongated, negative anisotropic crystals	Negative	Large amount of isotropic crystals
19.	Chestnut extract	3.0	"	Medium amount of elongated, negative anisotropic crystals and some flat birefringent crystals	"	

is also reduced and finally in the alkaline range, the reversing power is totally lost with the total absence of anisotropic crystals. It is to be noted further that in the case of myrobalan-dialysate, at pH 7 or above, no anisotropic crystals are seen, whereas under the same conditions, the dialysate of gambier contains a very small amount of small needle-like anisotropic negative crystals radiating from a common centre. This difference may be explained by assuming the presence of a strong acid group, probably a carboxylic group, in myrobalan-dialysate which titrates in the low pH range, whereas weakly acidic groups, probably the phenolic groups with pK values greater than 6-7, are present in the case of gambier dialysate, and these commence to be titrated at pH values greater than that of myrab. Further, at pH 2, in the case of myrab-dialysate, the quantity of anisotropic crystals is greater than at the natural pH value, but in the case of gambier-dialysate, practically there is no difference. From this finding, it would not be unreasonable to assume that the dialysate of myrab contains some salts which are converted to acids due to lowering of pH value and these acids are anisotropic whereas those of gambier are not anisotropic. Also, highly negative crystals convert the collagen fibre into a strongly negative fibre, whereas negative crystals exhibiting only a feeble b.r. convert the collagen fibre into a weakly negative fibre and moreover, higher concentrations are required for this latter conversion. Further, with a decrease in the pH value from 9 to 2 of all the dialysates, anisotropic crystals were formed again, though the quantity was less than the original, due probably to the conversion of a portion into an oxidised product at high alkalinity (e.g., pH 9) as seen from the fact that the solution was coloured. This oxidised fraction does not probably switch over to its original form when the pH value is lowered, resulting in the reduction of anisotropic crystals. The dialysate at pH 9 was not able to reverse the optical sign but the same solution, after lowering the pH value (especially below 7) by acidification with hydrochloric acid, could do so. The original anisotropic negative crystals were also reformed. It is known that both phenols (e.g., catechin) and phenol carboxylic acid (e.g. gallic acid) occur rather widely in nature as a complex mixture and if they are extracted with an aqueous solution of strong alkali, both phenols and carboxylic acids form salts (e.g. sodium gallate) which dissolve in the alkali. These salts are isotropic in nature. No anisotropic crystals were seen when the pH of the dialysate was more than 9. These results obtained at different pH values with the dialysates of vegetable tan liquor were verified by using phenol, *p*-catechin and gallic

acid. In this respect, it may be mentioned that the results obtained with gallic acid confirm the findings with dialysate of myrab liquor and those of *p*-catechin are comparable with those of gambier. Therefore, the components in non-tans which bring about the optical change are acidic in nature.

Experiments on dry heating of fibres showed that the negativity of the collagen fibre, obtained from condensed type tanning materials and their dialysates disappears in the temperature range 100°–120° C, whereas that caused by hydrolysable and mixed type tanning materials and their dialysates disappears in the temperature range 140°–160° C. It is evident from Tables 4 and 5 that the temperature and time required for the disappearance of the negativity is minimum when the negative b.r. is the weakest. Similarly, the temperature and time are the maximum when the negative b.r. of the collagen fibre is the highest. Hence, it appears that different constituents of non-tans are responsible for the different degrees of b.r. It was also observed that with the disappearance of negativity of collagen fibre, observed specially with dialysates, the very small anisotropic negative crystals disappeared and they reappeared after conditioning, the negativity of collagen fibre also returning. This fact strongly suggests that the very small negative anisotropic crystals lose their water of crystallisation due to heating and become isotropic. With the absorption of moisture from the atmosphere, the negative anisotropic crystals appear again, converting the positive fibre into a negative one which confirms the assumption of Marriott.⁴

It is to be noted that the crystals obtained from concentrated dialysates, especially from hydrolysable and mixed type tanning materials are considerably big and it was difficult to determine the nature of their b.r. by mere observation. Sometimes, these macro and micro crystals mask the double refraction of the collagen fibres due to heavy deposition on the surface of the collagen fibres and make it difficult to find out the nature of the b.r. of the treated collagen also. It was not possible to observe any anisotropic crystals inside the uniformly negative collagen fibre even at the magnification of about 1000 X.

The X-ray diffraction pattern of collagen fibres (KTT) treated with myrab liquor (Fig. 1) does not also reveal the presence of any macro-crystals in the treated fibres. The reflection due to the 11 Å spacing (the exact value of which depends on the water content) is not seen due to the intensity of the central halo and the 4.4 Å halo is extended to a complete ring. In the diffraction pat-

TABLE 4

Showing the effect of dry-heating on the optical properties of collagen and anisotropic crystals

S.No.	Birefringence of collagen after heating for 3 hours					Condition of anisotropic crystals	
	at 60-80°C	at 80-100°C	at 100-120°C	at 120-140°C	at 140-160°C	after heating in the range 140-160°C	after conditioning
	Negative	Negative	Negative	Negative	Positive	Disappeared	Reappeared
1. Myrobalan ..	Negative	Negative	Negative	Negative	Positive	—	—
2. Dialysate of (1) ..	"	"	"	"	"	Disappeared	Reappeared
3. Sumach ..	"	"	"	"	"	—	—
4. Dialysate of (3) ..	"	"	"	"	"	Disappeared	Reappeared
5. Babul ..	"	"	"	Isotropic	"	—	—
6. Dialysate of (5) ..	"	"	"	"	"	Disappeared	Reappeared
7. Gambier ..	"	"	Positive	Positive	"	—	—
8. Dialysate of (7) ..	"	"	"	"	"	Disappeared	Reappeared
9. Avaram ..	"	Isotropic	"	"	"	—	—
10. Dialysate of (9) ..	"	"	"	"	"	Disappeared	Reappeared
11. Dialysate of wattle bark ..	"	"	"	"	"	"	"

TABLE 5

Showing the effect of dry-heating for various periods on the optical properties of collagen

S.No.	Nature of birefringence	Dry-heating at 110°C			Dry-heating at 150°C		
		Time ½-1 hr.	Time 1-2 hrs.	Time 2-3 hrs.	Time ½-1 hr.	Time 1-2 hrs.	Time 2-3 hrs.
		No change	No change	No change	(-)	(-)	(+)
1. Myrobalan ..	Strongest negative	No change	No change	No change	(-)	(-)	(+)
2. Dialysate of (1) ..	"	"	"	"	(-)	(-)	(+)
3. Sumach ..	Stronger negative	"	"	"	(-)	(+)	(+)
4. Dialysate of (3) ..	"	"	"	"	(-)	(+)	(+)
5. Babul ..	Strong negative	"	"	"	(+)	(+)	(+)
6. Dialysate of (5) ..	"	"	"	"	(+)	(+)	(+)
7. Gambier ..	Weak negative	"	"	(+)	(+)	(+)	(+)
8. Dialysate of (7) ..	"	"	"	(+)	(+)	(+)	(+)
9. Avaram ..	Very weak negative	"	(+)	(+)	(+)	(+)	(+)
10. Dialysate of (9) ..	"	"	(+)	(+)	(+)	(+)	(+)
11. Dialysate (conc.) of wattle bark ..	Very very weak negative	(+)	(+)	(+)	(+)	(+)	(+)

tern of collagen fibres treated with myrab liquor and subsequently washed thoroughly in water (Fig. 2)—the fibres now being positively birefringent—the equatorial 11 A reflection is seen clearly, the central halo being less intense than in Fig. 1.

It is of interest here to compare the observations of Ramachandran¹³ on the changes brought about by lyotropic agents (especially nickel nitrate solution) on the X-ray diffraction pattern of collagen. The pattern of Fig. 1 of this paper is intermediate between those of Figs. 2 (b) and 2 (c) in the reference quoted. These two patterns correspond to treatments of collagen fibres with 100% w/v of nickel nitrate solution for 60 seconds and 65 seconds respectively. When the fibres were kept for a long time in the solution of nickel nitrate, they shrank to nearly one-third their original length. In the present investigation, the length of the fibres decreased on tanning but only slightly and not to the large extent observed with nickel nitrate solution. Further, Venkatraman¹⁴ observed only a *small* negative b.r. when elastoidin fibres were thermally shrunk to nearly one-third their original length. Hence the negative b.r. observed on myrab tanned collagen fibres seems to be brought about by the proper orientation of the benzene rings present in the nontan crystals rather than by a disorientation. Benzene rings are also present in the components of the myrab tannins (cross-linking the chain molecules), but these may be oriented such that they do not give rise to any negative b.r. The difference in the planes of orientation between the benzene rings of the tan and nontan components arises because the tans link two adjacent chains while the nontans may be attached only unipointly to a molecular chain of collagen. On washing with water, the unipointly attached compounds containing benzene rings are removed restoring the positive b.r. of the fibre. Unlike the case of lyotropic agents, the X-ray diffraction pattern of normal collagen is not completely restored here after washing in water. This is probably due to the additional cross-links formed by the tannin which might prevent the chain molecules regaining their configuration in the untanned state in the same way as they prevent the complete disorientation of the chains on treatment of the fibres with tanning agents containing nontans. However, more detailed X-ray investigation is necessary to clarify the nature of the effects.

PART III

It has been stated earlier that small size nontan crystals are responsible for the optical change of the collagen fibre. It is known that the dialysates of vegetable tanning materials contain acids,

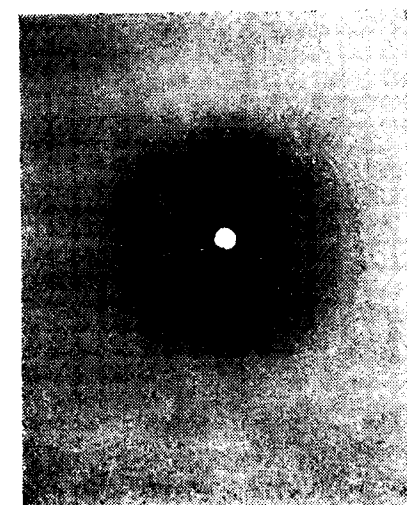


FIG. 1.
X-ray diffraction pattern of collagen fibres treated with myrobalan tan liquor.

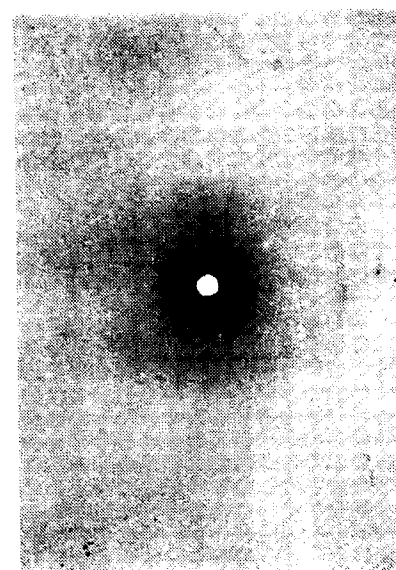


FIG. 2.
X-ray diffraction pattern of collagen fibres treated with myrcaban tan liquor and subsequently washed in water.

(The patterns in the figures were recorded on a flat plate camera at 4 cm. with CuK_α radiation.)

salts, phenolic and other substances. It was thought that if hide powder free from acids and salts is treated with dialysates, then the constituents which are responsible for the optical change would be adsorbed by the hide powder and the chemical constituents of the extracted substances from this hide powder could be determined.

Methods and Materials

50 g. of hide powder (passing a 10 mesh but retained by a 40 mesh sieve) was washed with 7 litres of distilled water. No acid or salt was detected in the final washings. The hide powder was dehydrated with sufficient acetone and dried in a vacuum desiccator.¹⁵

A small quantity of this hide powder was soaked for 24 hours in each of the concentrated dialysates obtained from myrobalan, babul and gambier. Then the hide powder was taken out from each dialysate and dried thoroughly. In the case of hide powder treated with dialysates obtained from gambier, the treatment had to be repeated with still higher concentrations of the same dialysates to make the hide powder negative after complete drying. These negative hide powders were extracted separately in Soxhlet with methanol.

For the sake of interest, different fractions of non-tans of myrobalan treated hide powder were collected separately. After each extraction, the hide powder was examined and a few drops of concentrated methanol extract liquor from each extraction were used to treat raw collagen. The optical changes which occurred in the fibre bundle as well as the nature of the anisotropic crystals after drying were observed. The findings are presented on page 119.

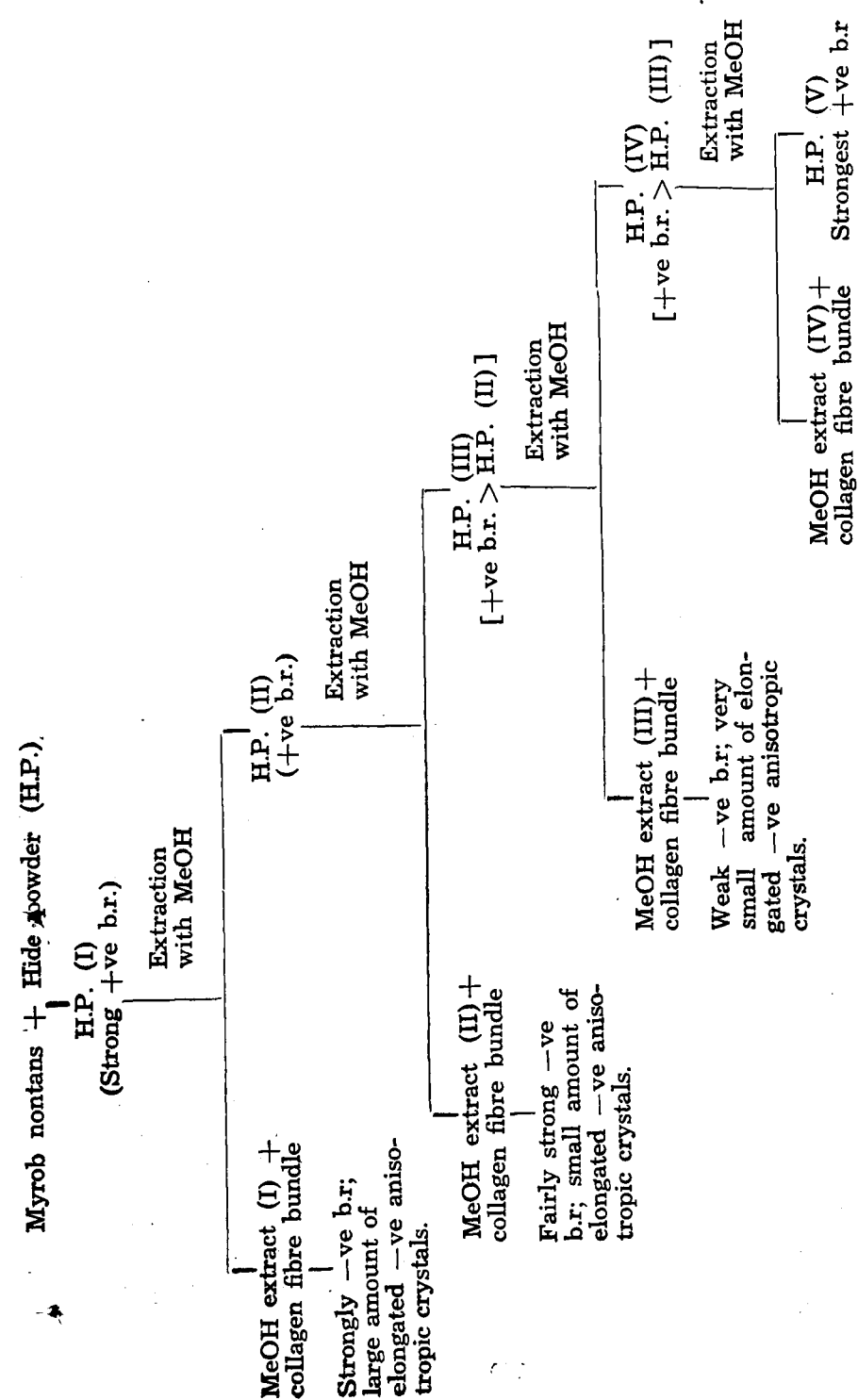
The methanol extracts obtained from myrobalan, babul and gambier were converted into aqueous extracts and collagen fibres were treated with these, keeping the fibre bundle under tension. Myrobalan, babul and gambier representing the hydrolysable, mixed and condensed types of tan-stuff yielded negatively birefringent fibres. Elongated, negative crystals were also found except in gambier.

The aqueous extracts obtained from the methanol extracts of negative hide powder were studied by the two-way chromatographic method¹⁶⁻¹⁷. For the sake of interest, pure gallic acid and D-catechin were also studied in the same way.

Data and Discussion

It is seen from page 119 that methanol extract of positively birefringent hide powder can change the optical sign of a fresh collagen fibre, provided the fresh collagen fibre is treated with concentrated extract. Moreover, it appears that with the number of extractions, the constituents which are responsible for the optical change are washed away, resulting in the absence or decrease in the b.r. as judged visually, by the decrease in the brightness of the fibre between crossed nicols. A minimum concentration of specific constituents present in non-tans or tan liquors is required for the optical change of collagen fibre. It appears that if the concentration is less than this, the reversal of optical sign is not possible though the b.r. is reduced. This is most probably the reason why some condensed type tanning materials are not in a position to alter the optical sign of collagen.

In this respect, it is worthwhile mentioning the experiments of Kuntzel *et al.*⁶ Extracts obtained from sumach tanned hide powder from which water solubles had already been removed, were used to tan hide powder. The removal of water solubles converted the original sumach tanned hide powder from a negatively birefringent to a positively birefringent substance, while the hide powder tanned with the extracts was converted from a positively birefringent to a negatively birefringent substance. Sumach tanned hide powder, already extracted with water was further extracted with an acetone-water mixture and however much this extraction was continued, the extract obtained always converted hide powder into a negatively birefringent substance. Therefore, Kuntzel *et al.* conclude that it is the manner of combination of tannin with collagen that is responsible for the optical change. There is the possibility, however, that in the course of extraction, some of the sumach fixed tannin may be split into phenolic non-tans as it is hydrolysable in nature. Then it would be the non-tans that are effecting the reversal of the optical sign. If one has to obtain a positively or negatively birefringent leather from the same tannin, it is obvious that the tannin must be oriented in different ways with respect to the collagen polypeptide chain. It is difficult to see how with a given chemical structure of the tannin and collagen, one can have different orientations. Or Kuntzel's ideas may imply different orientations of the collagen-tannin system as a whole, but such a drastic change in the orientation of the polypeptide chains does not seem likely.



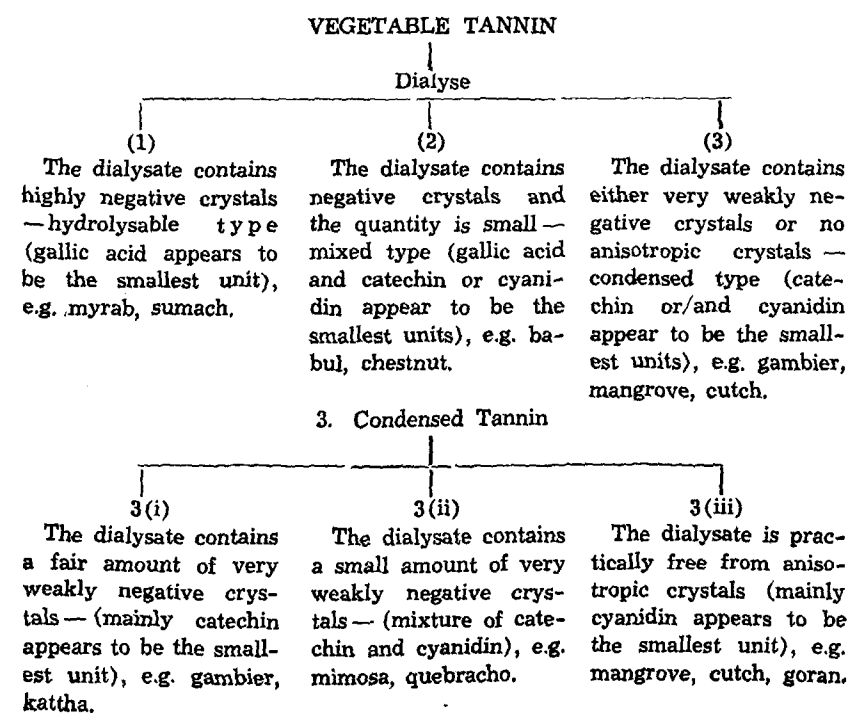
The crystals obtained from methanol extracts of negative hide powder are anisotropic, negative and elongated in shape, but there are no isotropic crystals. Hence, it appears that hide powder can absorb only phenolic substances but not salts as it has been observed earlier that the isotropic crystals are mainly salts. In the case of gambier, no crystals were seen; this is probably due to the masking effect of colloidal tannin, formed by the polymerisation of gambier-catechin¹⁸.

In this respect, special reference should be made to the validity of the usual tannin analysis method regarding quality evaluation especially for hydrolysable tan-stuffs; even where the tannin molecule is split up completely into its structural units (in other words, decomposed to the point of technical uselessness), the tannin contents determined by analysis will alter only in so far as the structural unit possessing no affinity for collagen is concerned. It has also been observed that nearly all the tanning materials contain both phenolic tans and non-tans, though the hydrolysable tanning materials contain more phenolic non-tans as observed from the quantity of anisotropic crystals, but both phenolic tans and non-tans show affinity for collagen. Hence, it appears that the tan content of a vegetable tanning material determined by the official method consists of both phenolic tans and non-tans though their mode of combination with collagen is different.

Phenolic tans are probably attached crosswise to polypeptide chains, rendering the structure more stable as observed from the rise of the shrinkage temperature, whereas the phenolic non-tans are attached parallel to the polypeptide chains which do not contribute to their stability, but rather to its labilization due to their lyotropic effect¹⁹ observed from the fall of the shrinkage temperature value and these substances are responsible for the reversal of the optical sign.

The nature of phenolic non-tans may be determined from the R_f value obtained from paper chromatographic studies^{20, 21} and this was done. It is seen that a spot obtained from myrobalan dialysate is identical to that of gallic acid and their R_f values are also the same. Hence, the phenolic non-tan of myrobalan is most probably gallic acid. Similarly, the spot obtained with gambier-dialysate appears to be catechin. Babul dialysate showed two spots, one is identical with that of gallic acid and the other is identical with that of catechin. Hence, it would appear that phenolic non-tans of babul-dialysate contain both gallic acid and catechin.

All the hydrolysable tannins and tannin units isolated so far can be traced back theoretically to the most elementary unit of this class of tannins, namely, gallic acid. Hydrolysable tannins are split into smaller components (i.e. crystalline) by (a) auto-hydrolysis and (b) by fermentation. It has been stated earlier that the dialysates obtained from all the tanning materials except goran and mangrove cutch alter the optical sign of the collagen fibre. It would seem, therefore, that leuco-anthocyanidins are likely to be of significance in relation to the chemistry of tannins present in goran and mangrove cutch. It is also interesting to note that usually the shrinkage temperatures of leather tanned by mangrove type of tanning materials (e.g. goran) show higher value than those of other vegetable tanning materials. Moreover, there is practically no difference (Basu *et al.* unpublished work) in the shrinkage temperature before and after removal of combined water solubles. This is most probably due to the absence of anisotropic crystals (or phenolic non-tans), because it is known that phenolic non-tans weaken the crossbonds of collagen. However, further work is required with different mangrove and eucalyptus tannins and pure chemicals to confirm this assumption. From the optical birefringence point of view, vegetable tanning materials may be classified as follows:



Acknowledgment

Thanks are due to the Director, Australian Leather Research Association, for providing the sample of kangaroo tail tendon, to Messrs. Naturin-Werk, Becker & Co., Weinheim, for free supplies of "Naturin" and to Professor G. N. Ramachandran of the University of Madras for the X-ray diffraction pictures.

REFERENCES

1. Schmidt, W. J. "Die Bausteine des Tierkörpers in polarisiertem Licht", Cohen, Bonn (1924).
2. Von Ebner, V., *Sitzber. Akad. Wiss. Wien, Math-naturw. Kl.* 103, 162, (1894).
3. Küntzel, A., *Collegium* 63 (1925).
4. Marriott, R. H., *J. Intern. Soc. Leather Trades' Chemists* 19, 246 (1935).
5. Küntzel, A. and Schwank, M., *Collegium* 489 (1940).
6. Küntzel, A. and Gratacos, E., *Das Leder* 9, 25 (1958).
7. Chamot, E. M. and Mason, C. W., "Handbook of Chemical Microscopy", Vol. 1, Ed. 2, p. 293 (1948).
8. Cahit Onen, "Die Türkei als Gerbstoffe", *Lufendes Land*, Ankara.
9. Hooper, D., *Acacia Catchu (cutch) Agric. Ledger* No. 3, 23-50 (1906).
10. Roberts, E. A. H. and Wood, D. J., *Biochem. J.* 53, 332 (1953).
Tsuji-mura, H., *Sci. Papers. Inst. Phys. Chem. Res. Tokyo* 38, 487 (1941).
11. Burton, D. and Bickley, J. C. J. *Soc. Leather Trades' Chemists* 38, 249 (1954).
12. Chamot, E. M. and Mason, C. W., "Handbook of Chemical Microscopy", Vol. 1, Ed. 2, p. 334 (1948).
13. Ramachandran G. N., "Recent Advances in Gelatin and Glue Research" (Pergamon Press, London), p. 32 (1958).
14. Venkataraman, S., "Proceedings of C.L.R.I. symposium on "Collagen", Madras, 1960, (Interscience, New York) to be published.
15. Burton, D. and Nursten H. E., "The Chemistry of Vegetable Tannins" (A symposium), *Soc. Leather Trades' Chemists*, p. 57 (1956).
16. White, T., "The Chemistry of Vegetable Tannins" (A symposium) *Soc. Leather Trades' Chemists*, p. 7 (1956).
17. Roberts, E. A. H., "The Chemistry of Vegetable Tannins" (A symposium) *Soc. Leather Trades' Chemists*, p. 87 (1956).
18. Ellis, S. C. and Pankhurst, K. G. A., *Discussions Faraday Soc.* No. 16, p. 170 (1945).
19. Gustavson, K. H., "The Chemistry and Reactivity of Collagen", (Academic Press Inc. New York), p. 192 (1956).
20. Hathway, D. E., *Biochem. J.* 63, 380 (1956).
21. King, H. G. C., and White, T., *J.S.L.T.C.* 41, 368 (1957).

RESEARCH BEARS FRUIT

Rapid sole leather tannage by vegetable-chrome-vegetable combination tannage*

BY

A. GANESAN & T. VIJAYARAMAYYA

Processes for manufacture of sole leather solely by vegetable tanning or chrome tanning have been described earlier. The present one is a combination tanning process. Partially delimed hides are first given a pretanning in vegetable tan liquors, then chromed and retanned, being drummed finally in strong vegetable tan liquors. The advantage of this process lies not only in the reduction of time of tanning, but also in that the usual defect associated with many rapidly tanned sole leathers, viz. the absence of a dark cut edge, is eliminated. Also the properties of the final leathers appear to be quite satisfactory. Details of the process are given hereunder.

Details of Process

Raw material:

Flint dried buffalo hides of Singapore origin of weight range 9-10 kg. (20-22 lb.) are taken.

Soaking:

1st day: About 800% water is taken in a pit. Caustic soda at the rate of 0.4 kg. per litre (1 lb. per 100 gallons) of water is dissolved and the hides are kept in this solution overnight.

2nd day: The hides are cut into sides, worked on the beam and put back in the same caustic solution. The alkalinity of the solution is maintained by addition of fresh quantity of caustic soda.

3rd day: The sides are handled in the solution. Bleaching powder at the rate of ½ kg. per 100 l. of water (½ lb. per 10 gal.) is now added and the sides are now put back in the solution.

*Process demonstrated at Rajkot (Gujarat State) during March/April, 1960.

4th day: The sides are taken out from the soak liquor and put into a drum which is run for ½ hour. They are then washed in running water for another ½ hour. By this time, the sides are found to be sufficiently soaked and the soaked weight is recorded.

Liming:

5th day: The lime liquor is prepared by taking half the quantity of once used lime liquor and filling up the rest with fresh water; about 12% of the slaked lime paste and 1% of sodium sulphide (on soaked weight) are added to the lime liquor. The liquor is plunged well and the sides are left in this liquor overnight.

6th day: The sides are handled twice in this liquor both morning and evening.

7th & 8th days: The sides are handled.

9th day: The sides are unhaired and relimed in a separate pit with 12% lime and ½% caustic soda (on soaked weight).

10th day: Handling is carried out once in the morning and once in the evening.

11th & 12th days: The sides are handled.

13th day: The sides are fleshed and the fleshed weight is recorded. They are put in plain water for 1½ hours and then scudded; after a change of water, they are left in the minimum quantity of water containing ¼% ammonium sulphate (on fleshed weight). The sides are left in this liquor overnight after a good handling for 10 minutes.

14th day: The sides are scudded once more and put in fresh water for ½ hour after which they are rinsed in 200% water containing ½% naphthalene sulphonc acid (on fleshed weight). The sides remain in this bath for 10 minutes after which they are taken to the first tanning pit.

Tanning:

The tanning blend used is 1½ parts of babul and 1 part o myrob. The two materials are leached in a leach battery to obtain a liquor of about 65°Bk. This is strengthened with sufficient wattle extract (Kenmosa) to give a liquor of 80°Bk.

15th day: The partially delimed sides are put in a weak tann liquor (6°Bk and pH 4.25), handled four times and left in the liquor overnight.

16th day: The sides are then transferred to a liquor of 8°Bk (pH 4.25), handled 3 times during the course of the day and left overnight in the liquor.

17th day: The sides are transferred to a pit containing liquor of 10°Bk (pH 4.2).

18th day: The sides are transferred to liquor of 15°Bk and pH 4.2.

19th day: The sides are transferred to liquor of 20°Bk and pH 4.2.

20th day: The sides are transferred to liquor of 25°Bk and pH 4.2.

21st day: The sides are transferred to liquor of 30°Bk and pH 4.2.

Note: With progress in tanning, each day ¼ of the liquor in a pit is transferred to the next one (i.e. of lower Bk°), the portion from the pit containing the weakest liquor being rejected.

22nd day: A mixture of 6% B & C chrome extract powder, 2% naphthalene sulphonc acid and 1% wattle extract liquor of 100°Bk is prepared. Using a float just sufficient to immerse the sides in a drum (i.e. about 100%), the sides are drummed in the above mentioned solution for 4 hours; after this period, it is found that the chrome has penetrated completely and that the colour of the leather is not affected adversely. The sides are then put in 65°Bk liquor overnight.

23rd day: The sides are drummed in 65°Bk liquor for 1 hour, then in 80°Bk liquor (liquor of this strength is obtained by adding the requisite amount of wattle extract to the stock liquor) for another hour and then in 100°Bk wattle extract liquor for two hours; the sides are kept overnight in this liquor at a temperature of 50°C.

24th day: In the morning, the sides are found to be completely tanned after which they are aged for a day.

25th day: The sides are washed for 1½ hours in running water in a drum and are bleached with ½% sodium bisulphite and ¼% oxalic acid (on fleshed pelt weight). They are first drummed with bisulphite for 5 minutes after which the oxalic acid is added slowly in a stream, as 1% solution. The drum is run for 15 minutes more after completion of addition of oxalic acid. The sides are then horsed up and allowed to drain.

The sides are then oiled with a mixture of 2½% TRO, ¾% groundnut oil, ¼% tallow and ¼% kerosene (on pelt weight). Tallow is first melted and while hot is mixed with groundnut oil; kerosene is next added and finally the whole is added to TRO. This oil mixture is applied to the grain side of the leathers. A mixture of 2% Epsom salt and 3% liquid glucose prepared with the minimum quantity of water is also applied on the flesh side of the sides before hooking up for drying.

Setting:

26th day: The sides are set out well with setting machine. About ¼% of groundnut oil (on pelt weight) is applied to the grain side uniformly and the sides are allowed to dry.

Drying:

27th day: The sides are seasoned with the recipe given below and rolled.

Preparation of season

1 part of casein is dissolved in 6 parts of hot water with the aid of ¾ parts of borax. ½th part of bar soap (solid) is also added and to adjust the pH of the system ½th part of boric acid (solid) is added. ½th part of linseed is cooked with minimum quantity of water and the mucilage so extracted is also added to the solution and the whole made up to 10 parts. This is applied on the grain side of the sides which are then dried and then rolled first lightly and rerolled heavily. The sides are then weighed. The percentage yield obtained is 55-56% on fleshed weight and about 170% on flint dry weight.

RESEARCH BEARS FRUIT

Vegetable-chrome-vegetable combination tannage as a substitute for bag tanning*

BY

W. N. PANDAV & A. GANESAN

In most of the village tanneries in India, bag tanning is followed. Sometimes, however, the hides are so badly cured that it is not possible to stitch them into bags. The following process using vegetable-chrome-vegetable combination tannage is advantageous in such cases. In this process, the time taken for complete tanning is not more than that required in the bag tanning process. Bag tanning pit or other pits are not necessary; the work can be carried out in a small pit or vat even in the open. The properties of such leathers are similar to those of bag tanned leather. The hard labour involved in bag tanning also is eliminated.

Details of Process

Raw material:

Usually air dried stock of weight range 6.8-10.0 kg. (15-22 lb.) is taken.

Soaking:

The stock is weighed and put in plain water in a pit, the float taken being enough to immerse the hides completely. The soak liquor is rendered alkaline by adding a little lime or sulphide, in order to avoid harmful bacterial action. The hides are taken out after soaking for 3-4 hours and worked on a beam. During this beaming, the hard thin film on the flesh side is removed wherever possible. The hides are put back in the soak liquor and left there preferably overnight. Next morning, they are found to be soft. If further soaking is desired, the process may be repeated. The soaked weight is recorded at this stage.

*Process demonstrated at Patan (Gujarat State) in March, 1961.

Liming:

The lime liquor is prepared with 50% old lime liquor and 50% fresh water to which are added 1% sodium sulphide and 7½% lime (on soaked weight). The hides are retained in this pit for two days (2nd and 3rd days), being handled daily twice.

4th day: The pack is unhaired and relimed with 10% lime (on soaked weight) and water sufficient to cover the hides, in a pit. The pack is handled twice and left overnight.

5th day: The pack is handled twice. In order to obtain the requisite amount of plumping, ¼% caustic soda (on soaked weight) dissolved in a little water is added.

6th day: The pack is handled twice.

7th day: The hides are fleshed and the fleshed weight is recorded. The pack is washed in two changes of fresh water. ¼% naphthalene sulphonic acid (C.L.R.I. product) or ½% ammonium sulphate (on the fleshed pelt weight) is dissolved in a little water and the goods are handled in this solution for 20 minutes and left overnight in it.

50% of babul bark (on the fleshed pelt weight) is soaked and the liquor obtained is kept ready for colouring the next day.

8th day: A cut section of the delimed pelt would show complete deliming. The pelts are washed in water and scudded.

The scudded pelt is given a wash and put into the tan liquor prepared the previous day. The stock is handled for 15 minutes and then piled up. In order to obviate any discolouration, the stock is handled thrice on this day. The hides are left in this pit overnight.

9th & 10th days: The hides are handled in the malni tan liquor.

11th day: The stock is taken out, beamed and put into the chrome bath containing 3% B & C chrome extract powder and 2% salt (on the fleshed pelt weight). The bath is prepared by taking enough water and adding to it the dissolved chrome extract powder and salt. After being put in, the stock is handled.

Note: In case B & C chrome extract powder is not available, molasses or jaggery (Gur) reduced chrome liquor could be used. The liquor is prepared by adding slowly with stirring, ½ part molasses or jaggery to

a mixture of 1 part sodium dichromate and 1 part sulphuric acid. A quantity of this liquor corresponding to ½% dichromate (on the fleshed pelt weight) is taken.

12th & 13th days: The chromed pelts are handled in the bath.

14th day: The chrome tanned stock is taken out, beamed and entered into freshly prepared babul liquor. The liquor is prepared with 100% babul bark (on weight basis, on fleshed weight) so that the total amount of tanning material taken is 150%.

15th to 17th days: The stock is handled in the liquor.

18th day: The stock is taken out, washed and drained. The leathers are oiled off with about 2% gingelly (Til) oil. The oiled stock is kept piled overnight.

19th day: The stock is hung up for drying. It is set out and hung up again.

20th day: The stock is set out and finished.

LETTERS TO THE EDITOR

Studies on biosynthesis of tannins in indigenous plants

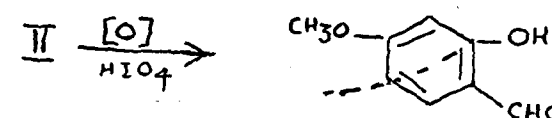
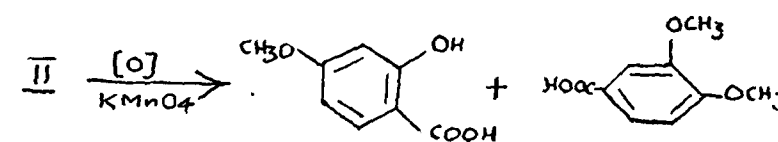
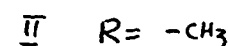
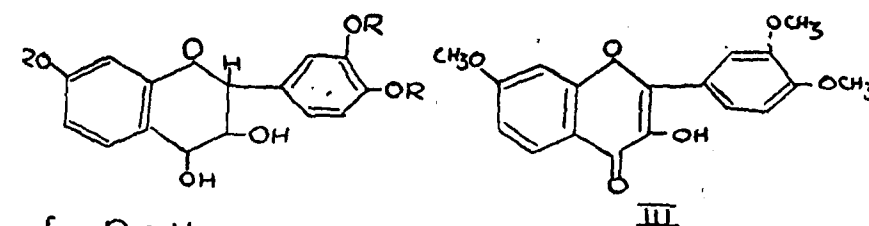
Part V: Occurrence of a flavan-3: 4-diol in *Pithecolobium dulce*.

Pithecolobium dulce [Kodukkapuli (Tamil), *Simachinta* (Telugu)] is a tree of medium size found in many parts of South India. It is commonly used as a fuel and in making various agricultural implements. According to Udaya Varma *et al.*,¹ the tannin content of the bark is about 25% and it is a good substitute for wattle bark in tanning (cf. Mathew²).

A quantity of the bark collected locally was investigated with respect to its extractable constituents. The only noteworthy product was a light amorphous powder amounting approximately to 1-1½% of the bark, phenolic in nature and largely soluble in water. The crude phenolic product was shown by Zeisel analysis to be methoxyl free. It was substantially a single compound as shown by paper chromatographic studies. When treated with diazomethane, it gave only one crystalline optically active derivative C₁₈H₂₀O₆ (II) containing three methoxyl groups. This methyl derivative produced no colour with ferric chloride and was insoluble in alkali; but formation of a diacetate indicated the presence of two alcoholic groups. Oxidation of the trimethyl ether with potassium permanganate yielded a mixture of acids which were separated by conversion into methyl esters, one of them being phenolic and therefore alkali soluble. The phenolic ester was identified as methyl 2-hydroxy-4-methoxybenzoate and the accompanying neutral ester as methyl 3: 4-dimethoxybenzoate.

From the formation of these two oxidation products, one of them an *ortho*-dihydroxy acid, it seemed probable that the compound contained a dihydrodihydroxypyran nucleus. The ready oxidation of the trimethyl ether with periodic acid proved that the two OH groups were present as an α -glycol unit. 2-Hydroxy-4-methoxybenzaldehyde was isolated from this reaction; this showed the position of the diol system with respect to the principal aromatic ring. Conclusive evidence for the structure of the compound was then obtained from the Oppenauer oxidation of the trimethyl ether which yielded 7: 3': 4'-trimethoxy flavonol (III).

It is therefore one of the stereoisomeric 7: 3': 4'-trihydroxy flavan-3: 4 diols represented as (I).



Paper chromatographic studies of the compound were carried out using *n*-butanol: acetic acid: water (4: 1: 2.2) in the first way followed by 2% acetic acid in the second way³ and spraying was done with bisdiazotised benzidine reagent. Heating the compound with mineral acid produced a deep red solution which gave a maximum in U.V. at 530 mμ characteristic of fisetinidin chloride.

The present work supports Bate-Smith and Swain⁴ contention that leuco-anthocyanins (flavan-3: 4 diols) in addition to catechins (flavan-3-ols) are to be regarded as prototypes of condensed tannins. —

August 8, 1961.
C.L.R.I., Madras-20,

S. RAJADURAI.

REFERENCES

1. Udaya Varma, M. K., Mathew E. C., and Das, B. M., *Bull. Cent. Leath. Res. Inst.* 3, 7 (1956).
2. Mathew, E. C., *Bull. Cent. Leath. Res. Inst.* 5, 12 (1958).
3. Artwright, and Roberts, *J. Sci. Fd. Agr.* 5, 593 (1954).
4. Bate-Smith, E. C., and Swain, T., *Chem. and Ind.* 377 (1953).

Studies on biosynthesis of tannins in indigenous plants

Part VI: Isolation of quercetin from the heartwood of dhawa

In an earlier communication,¹ work on the cyclohexane carboxylic acids, polyols and amino acids of leaves of dhawa (*Anogeissus latifolia*) was reported. Studies were extended to the heartwood region also. The present communication reports the occurrence of quercetin in this.

Experimental: Well powdered heartwood portion of dhawa plant was successively extracted with acetone. From the combined acetone extract solutions, reddish yellow in colour, the solvent was removed under reduced pressure in nitrogen atmosphere and the residue taken up in water. The aqueous solution was repeatedly extracted with ether and the ethereal solution dried over anhydrous Na_2SO_4 . After removal of ether, the solid residue obtained was crystallised from 70% ethanol, when a crystalline yellow substance was obtained. This was identified as quercetin as per procedures described earlier in the case of babul leaves.

Studies carried out at this Institute have shown that the tannins of dhawa leaves are of the hydrolysable type. The presence of quercetin—a compound of biogenetic significance vis-a-vis condensed tannins—in the heartwood would therefore suggest that while the leaves synthesise hydrolysable tannins, condensed tannins are formed in the heartwood—a picture similar to that given by King and White³ for quebracho.

August 10, 1961.

C.L.R.I., Madras-20.

K. K. REDDY,
K. N. S. SASTRY,
S. RAJADURAI,
Y. NAYUDAMMA.

REFERENCES

1. Reddy, K. K. et al., *Bull. Cent. Leath. Res. Inst.* 8,64 (1961).
2. Bhanu, K. U. et al., *Bull. Cent. Leath. Res. Inst.* 8,24 (1961).
3. King, H. G. C. and White, T., *J. Soc. Leather Trades' Chemists*, 368 (1957).

TECHNICAL SEMINARS

Water-proofing of sole leather*

BY

P. L. MUTHIAH

For improving the water-resistance of vegetable tanned sole leather, a preliminary study has been carried out with the following materials: (1) waxes, (2) wax emulsion, (3) aluminium stearate, (4) chrome stearate complex, (5) chrome rosinato complex, (6) chrome cationic complex, (7) latex (syntan stabilised), (8) latex (cationic stabilised), (9) cetyl oleate, palmitate and stearate. The effect of semi-chrome, semi-zirconium and semi-aluminium tannage and of alum dipping also were studied. Alum dipping appears to give greater improvement with regard to water-resistance; waxes and other compounds mainly make the surface water-repellent.

A systematic study on the water-proofing of sole leather by treatment with aluminium salts (alum dipping) has been next taken up. Considerable increase in water-resistance and weight has been noticed. The oil content in the sole leather also has been found to have its own effect on water-resistance of leather treated with aluminium salts. 5% (on the wet weight of the leather) of a 1:1 mixture of groundnut oil and kid finishing oil has been found to give the maximum water-resistance when alum dipping is carried out after oiling.

Apart from being simple and economical, alum treatment for water-proofing has some added advantages over treatment with waxes and resin: negligible decrease in air-permeability; retention of water-resistance obtained even on repeated soaking and drying; permanence and evenness of the water-resistance throughout the entire thickness of the sole in contrast to the surface effect obtained in other treatments.

*Summary of the talk given on July 28, 1961.

Myrobalan as a self tanning material*

BY

K. J. KEDLAYA

Myrobalan liquor undergoes auto-hydrolysis and also hydrolysis due to mould growth resulting in the formation of bloom and other hydrolytic products; the latter are known to have some swelling effect on collagen. Leather tanned in myrobalan liquor alone possesses poor abrasion resistance, low shrinkage temperature and is also darker in colour due to deposition of insoluble degradation products on the surface.

The present studies have been undertaken with a view to so modify myrobalan that a major portion of its tannins may be utilised for commercial exploitation. In analogy with sweetening of chestnut extract, an attempt has been made to modify myrobalan tannin with a view to use it as single tanning material.

For this study, addition of various percentages of NaOH, Na₂CO₃, Na₃PO₄, NaHCO₃, Na₂SO₃, NH₄OH, Na₂B₄O₇ and sodium citrate, either singly or in binary and ternary mixtures has been tried with a view to prevent the hydrolysis mentioned earlier and to bring about complexing of the degradation products to form compounds devoid of swelling effect.

Collagen fibril tanned with myrob and other hydrolysable tannins shows highly negative birefringence. [The negative birefringence has been shown to be due to the presence of negatively birefringent phenolic nontan crystals (*vide Bull. C.L.R.I.* 6, 333 1960)]. By treating myrob liquor with a little borax, the negative birefringence of the fibre is decreased due to partial modification of these needle shaped negatively birefringent crystals. Leather obtained by tanning with borax treated-myrobalan liquor possesses better thermal stability (T₂) and better colour and feel.

Sulphite treated-myrobalan liquor tanned leather is also lighter in colour, but thermal stability is less since it is not so effective as borax in modifying the needle shaped phenolic nontan crystals. By the addition of the chemicals mentioned earlier, the amount of needle shaped crystals of hydrolytic products in the dialysate of myrobalan liquor decreases as has been noticed in the case of sweetened chestnut extract.

*Summary of the talk given on August 18, 1961.

TANNERS' CORNER

The Central Leather Research Institute has been since its inception rendering technical aid to the leather industry through answering technical enquiries on specific problems. The number of such enquiries has been increasing year by year. In order that the information contained in the replies to the technical enquiries may be made available to all those who have similar problems, this new feature "Tanners' Corner" has been inaugurated. Typical questions will be reproduced herein with the relevant answers. It is hoped that the industry will fully utilise this new feature and bring more and more of its problems for solution by this Institute.

Q. V. E. I. leathers produced are found to be not stiff; on the other hand they are very loose; normal yield also not obtained. How are these defects to be remedied?

Answer: Generally, the looseness and lower yield in E.I. tanning may be attributed to one or more of the following:

- (1) Water being hard, containing especially salts of magnesium or calcium or sodium chloride.
- (2) Use of stale lime liquors.
- (3) Hides being not properly plumped up.
- (4) Prolonged deliming with water containing organic impurities and salts of magnesium or calcium.
- (5) Over deliming.
- (6) Less amount of bark and less duration in bark.
- (7) Too long a duration in myrobing.

By avoiding the above, the defects mentioned could be remedied.

Q. VI How to prevent fungus growth in shoes that are exported?

Answer: The moisture content of the shoes is one of the factors responsible for the appearance of fungus on the leather. It may not be possible to avoid the fungus merely by passing shoes through a hot chamber. Mould growth will appear again

when these are taken out from the hot chamber and packed since the seeds (spores) of these fungi are already present in the leather; when the conditions are favourable, the mould growth appears after absorbing moisture from the atmosphere.

The best way to prevent mould growth is to make the leather mould resistant during the processing of leathers. It is possible to prevent the growth of mould as follows:

(1) Spray the shoes with an alcoholic solution (50% rectified spirit) using $\frac{1}{250}$ paranitrophenol or $\frac{1}{100}$ β -naphthol or 0.6% salicyl anilide (sold by I.C.I.).

(2) The 12½% emulsion of pentachlorophenol (sold by Shell Chemicals) may be diluted with 50 times its volume of water and the emulsion swabbed on to the upper leather. The shoes can now be stored. They should however be periodically examined and if necessary a second coat may be given.

Note: Gloves should be worn by the person who swabs on the emulsion.

CLASSIFIED ABSTRACTS

VEGETABLE TANNING

An improved lead salt method for purifying black wattle tannins.

D. G. Roux, T. H. Miller, and E. A. Maihs (Leather Industries Research Institute, Rhodes University, Grahamstown, South Africa) *J. Am. Leather Chemists' Assoc.* 56, 362 (1961). Use of a cation exchange resin has been shown to improve the lead salt purification method for black wattle "mimosa" tannins. Tannins of high purity may be recovered in good yield from the extract.

OTHER TANNAGES

The retannage of chrome-tanned leather with vegetable tannins.

Joseph R. Kanagy (Leather Section, National Bureau of Standards, Washington 25, D.C.) *J. Am. Leather Chemists' Assoc.* 56, 252 (1961). The retannage of chromed collagen with vegetable tannins has been studied with calfskin squares, standard hide powder, and standard hide powder ground to pass a 0.5-mm. sieve. The diffusion of the tannin, as indicated by the rates at which collagen in these three states of subdivision absorbed tannins, was related to the chrome pretannage. The affinity of the prechromed material over that of the unchromed material for vegetable tannins was greatest for sulfited quebracho and wattle and least for chestnut and tannic acid. The affinity is related to the chrome content of the leather. Maximum adsorption of sulfited quebracho took place when 2.4-3.78% of chromic oxide was present. The reaction of vegetable tannins with chromed collagen appears to occur at two different rates, a rapid rate which for the finely ground material is complete in 30 minutes, and a slow rate which continues over a longer period of time. It has been postulated that the slow rate of reaction is related to the loss of sulfate from the chrome complex. A study of the data indicated a correlation between loss of sulfate determined as H_2SO_4 and increase in tannin content. This may, however, be attributed to a simultaneous change in the equilibrium of the system rather than to direct replacement of sulfate by tannin.

TESTING

Gas-liquid chromatography of fatty derivatives. III. Analysis of fatty amines.

W. E. Link and R. A. Morrisette (Archer-Daniels-Midland Co., Minneapolis, Minnesota) and A. D. Cooper and C. F. Smullin (Atlas Powder Co., Wilmington, Delaware) *J. Am. Oil Chemists' Soc.*, 37, 364 (1960). The separation of fatty amines has been carried out with nonpolar substrates on solid supports of Chromosorb and Chromosorb W, which were previously treated with potassium hydroxide to overcome adsorptivity. In this manner well-resolved symmetrical peaks are obtained. Untreated supports give peaks which trail and prohibit precise quantitative measurements. Both Apiezon L on Chromosorb W and Silicone Grease on Chromosorb have proved effective, the latter at 176°C. and the former at 225°C. Relative detector sensitivity factors have been determined for the amines C₈ to C₁₈, thus permitting accurate analyses. The relative response for primary alkyl fatty amines is a linear function of molecular weight.

Fractionation of fats, oils, and waxes on thin layers of silicic acid.

Helmut K. Mangold (Univ. of Minnesota, The Hormel Inst., Austin, Minnesota) and Donald C. Malins (Tech. Lab., Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service, Seattle, Washington) *J. Am. Oil Chemists' Soc.* 37, 383 (1960). Adsorption chromatography on thin layers of silicic acid or alumina provides a new and highly efficient analytical tool for the rapid separation of lipids according to classes of compounds.

A critical study of the oxidation methods for the determination of glyceride composition of fats.

Gollamudi Lakshminarayana and Damascene Rebello (Department of Chemical Technology, University of Bombay, Bombay) *J. Am. Oil Chemists' Soc.* 37, 274 (1960). A critical evaluation of the individual steps in Hilditch's acetone-permanganate and Kartha's acetone-acetic acid-permanganate oxidation methods for the determination of the glyceride type of composition of fats was carried out in order to examine the limitations of these methods. Concentrates of mono-unsaturated-disaturated (GS₂U) and monosaturated-diunsaturated (GSU₂) glycerides, and pure monoazela-disaturated glycerides (GS₂A) were used to obtain definite conclusions.

An alumina column chromatographic procedure was standardized for the quantitative separation of neutral triglycerides from the acidic and hydrolysis products of oxidation. By this procedure both oxidation methods gave values higher than the actual for the trisaturated glyceride content of the concentrates. This increase was shown to be due to the probable formation of alpha-ketols from the unsaturated acids in Hilditch's oxidation and the corresponding acetyl derivatives in Kartha's oxidation. These incompletely oxidized glycerides were formed to a greater extent in Kartha's oxidation than in Hilditch's oxidation.

The saturated acid content was determined accurately by Kartha's oxidation and Bertram separation procedure whereas Hilditch's oxidation gave slightly lower values.

The GS₂A were unaffected by the carbonate washing procedure of Hilditch and Lea. However the GS₂U were found to hydrolyze considerably in Hilditch's oxidation. The GSU₂ were hydrolysed appreciably in Kartha's oxidation procedure whereas the GS₂U were very slightly affected. As a result of this, Kartha's method, when applied to the GSU₂ concentrates, gave an increase in GS₂U and GU₃ contents and a decrease in GSU₂ content.

The effects of incomplete oxidation and hydrolysis on the determination of glyceride composition were demonstrated. This investigation explains the differences in the results obtained by Hilditch's crystallization method and Kartha's oxidation method. As the experimental basis of Kartha's restricted random distribution theory is unsound, this theory must be reexamined.

THEORIES

Carbohydrates in protein. 2. The hexose, hexosamine, acetyl and amide-nitrogen content of hen's-egg albumin.

Patricia G. Johansen, R. D. Marshall and A. Neuberger (Department of Chemical Pathology, St. Mary's Hospital Medical School, London, W.2.) *Biochem. J.*, 77, 239 (1960). Mannose is the only neutral sugar that has been recognized in egg albumin by paper chromatography. Colorimetric techniques have been applied and they indicate the presence in the protein of about 2% of this sugar, or five residues/45000 g. The difficulties which are liable to be encountered in liberating glucosamine from polysaccharide linkage have been discussed. The glucosamine liberated by hydrolysing egg albumin and the isolated polysaccharide from it under various conditions has been measured by both the direct Elson-

Morgan reaction and also the Cessi modification of it. Both methods indicate a value of about 1.2% as the glucosamine content of the protein (three residues). The possibility of a fourth molecule of this or some other amino sugar cannot be completely excluded, for reasons which have been discussed. The Cessi procedure, which depends on the formation and steam-distillation of a steam-volatile chromogen (2-methylpyrrole), has been shown to be more specific than the original Elson-Morgan method. Thus 3-substituted glucosamines are not determined at all by this method. Most of the recorded amide-nitrogen values of glycoproteins probably need correction, because 2-amino sugars are deaminated under the alkaline conditions used in the liberation of ammonia. This complication has been overcome by precipitating the ammonia with phosphotungstic acid. The amide nitrogen content of egg albumin is believed to be 31 ± 1 residues/mole. The acetyl content of egg albumin has been shown to be four residues, and at least three of these have been shown to be associated with the carbohydrate moiety in the protein. The glucosamine is partly, if not wholly, N-acetylated. The possibility that the substituent at the N-terminus of the protein chain is an acetyl group has been discussed.

Surface-active properties of sodium salts of sulfated fatty acid monoglycerides.

A. K. Biswas and B. K. Mukherji (Department of Applied Chemistry, Univ. College of Science and Technology, Calcutta), *J. Am. Oil Chemists' Soc.*, **37**, 171 (1960). Sodium salts of fatty acid monoglyceride sulfates have been prepared by sulfating purified monoglycerides with chlorosulfonic acid or a pyridine-sulfur trioxide complex and subsequent neutralizing. Surface tension, interfacial tension, wetting, suspending and foaming characteristics, calcium stability and emulsifying property (including stability of the emulsion obtained) of the aqueous solution of these surfactants from C_{12} , C_{14} , C_{16} , and C_{18} saturated fatty acids and from oleic and linoleic acids have been determined and evaluated.

With the exception of the wetting characteristic which was found to be optimum in the case of the more hydrophilic products (like those from lauric and linoleic acids) the remaining properties were found to reach a maximum value when the hydrophilic-hydrophobic balance in the surfactant molecule was seemingly optimum, as attained by myristic and oleic acid products.

Biogenesis of polyunsaturated acid in fish.

James F. Mead, Mitsu Kayama, and Raymond Reiser, (Laboratory of Nuclear Medicine and Radiation Biology, Depart. of Biophysics and Nuclear Medicine, and Depart. of Physiological Chemistry, School of Medicine, Univ. of California, Los Angeles), *J. Am. Oil Chemists' Soc.*, **37**, 438 (1960). Following injection of *Tilapia mossambica* with acetate- $14C$, their fatty acids were isolated, fractionated, and degraded. The high content of linoleic and arachidonic acids was evidently derived from the diet. Degradation of these acids revealed a distribution of carbon-14 similar to that found in similar studies on mammals.

BYE-PRODUCTS

The solubility of wool dyes. Its assessment and practical significance.

W. Beal, *J. Soc. Dyers Colourists*, **76**, 78 (1960). The methods of testing the solubility of wool dyes at present in use are criticised and a new method is suggested. This method takes into account such variables as liquor : goods ratio, temperature at which dyeing is commenced, the dyeing assistants used, the type of water, the depth of shade being dyed, and the method by which the dyebath is prepared.

The dyeing of wool by solvent-assisted processes.

W. Beal, K. Dickinson, and E. Bellhouse, *J. Soc. Dyers Colourists*, **76**, 333 (1960). The influence of solvents, in particular benzyl alcohol, on the normal processes of wool dyeing and printing is reviewed in detail. The significance of the effect and the methods of utilising it are discussed. Consideration is given to the practical and commercial aspects of solvent-assisted techniques for dyeing and printing wool.

The effect of solvents in wool dyeing.

L. Peters, C. B. Stevens, J. Budding, B. C. Burdett, and J. A. W. Sykes, *J. Soc. Dyers Colourists*, **76**, 543 (1960). In order to study the mechanism of solvent-assisted wool dyeing, using benzyl alcohol as the solvent, measurements have been made of (a) the sorption of the solvent from aqueous solution by wool, (b) the solubility of the solvent, and (c) its effect on the surface tension of water at different temperatures. The heats and entropies of sorption, surface formation and solution are consistent with the hypothesis that the sorption of benzyl alcohol by wool most

probably consists merely of physical adsorption on the intermicellar surfaces in the fibre. Increased swelling of the wool fibres in aqueous solutions of the solvent is not apparent, and the accelerated rate of dyeing is shown to depend on the affinity of the dye for the solvent, as measured by the partition ratio of dye in the solvent to dye in the water. The solvent lowers the activation heat barrier, but increases the activation entropy barrier: whether it accelerates or retards dyeing depends on which is affected to the greater extent.

Wool as a fibre in dyeing and finishing.

A. B. D. Cassie, *J. Soc. Dyers Colourists*, 76, 617 (1960). The importance of the setting of wool fibres on packages is discussed in relation to cloth manufacture and shrinkage in finishing. Some remarkable changes that come about in low-temperature dyeing of wool when fibres are cleaned with various solvents are described.

NOTES AND NEWS

Export of shoes

Orders from Russia and E. Germany

India has secured orders for another 1,10,000 pairs of shoes from Russia and for 2,82,000 pairs from East Germany, Mr. Manubhai Shah told Mr. Jugal Kishore in the Rajya Sabha.

Asked about steps being taken to help the Agra shoe industry, Mr. Shah said that as against the total estimated production of four to five million pairs at Agra, the export orders of four to five lakhs pairs a year was only a minor fraction. However, in order to assist shoe fabricators with export orders, the National Small Industries Corporation had established a "procurement centre" at Agra. In 1961-62, orders had been given at this centre for supply of 76,400 pairs of shoes to Russia. Further orders for Indian shoes had since been received from Russia and East Germany and these would be distributed to small fabricators shortly.

The Hindu: September 7, 1961.

Shipments of hides and skins during August, 1961.

Shipments during August, 1961 were as follows (in bales): To the U.K. 2,163 tanned cow hides, 149 tanned cow calfskins, 19 tanned buff hides, 115 tanned buff calfskins, 423 tanned goatskins, 264 tanned sheepskins; Continent 71 tanned cow calfskins, 34 tanned buff calfskins, 890 tanned goatskins, 415 tanned sheepskins; U.S.A. 82 tanned buff hides, 148 tanned buff calfskins, 188 tanned goatskins; Japan 2 tanned goatskins, 208 tanned sheepskins; Aden and Berbera 33 tanned cow hides; total 5,204 bales.

The Mail: September 3, 1961.

Cattle Insurance in Madras State

Mr. M. Bhaktavatsalam, Minister in charge of Agriculture, said in reply to a question by Mr. V. K. Kothandaraman in the Legislative Assembly, that the pilot scheme for cattle insurance

would be taken up in the State during the Third Plan period. Details of the scheme had not yet been finalised, he added.

The Hindu: September 19, 1961.

Proposal for sheep farm in Madras State

A sheep farm and 12 sheep and wool extension centres were proposed to be started in the State during the Third Plan period, said Mr. M. Bhaktavatsalam, Minister in charge of Agriculture, and Animal Husbandry, in reply to a question tabled by Mr. S. M. Annamalai in the Legislative Assembly. The Minister stated that the new sheep farm would be located in the existing Ramanathapuram District Livestock Farm at Chettinad. The exact location of the extension centres had not yet been settled.

The Hindu: September 21, 1961.

Health of animals

Control of Parasitic Diseases urged

A four-day conference on Parasites and Parasitic Diseases, convened by the Indian Council of Agricultural Research, was inaugurated by Mr. M. Bhaktavatsalam, Minister for Agriculture and Animal Husbandry, Madras State, at the Veterinary College, Vepery. Mr. L. Sahay, Animal Husbandry Commissioner, Government of India, was in the chair.

In his inaugural address, Mr. Bhaktavatsalam said one of the foremost problems facing a livestock owner in a tropical country like India was that of keeping the livestock healthy. Animals infected with parasitic diseases of one kind or another were a drain on the resources of the individual who owned them. Further, the fact that men lived in close association with animals and consumed their meat gave room for the parasites to be communicated from animal to man.

Mr. Sahay, in his presidential address, said that the ICAR, ever since its inception, had been conducting conferences on special subjects and a few years ago it was decided to widen the scope of such conferences to bring within the field not only animal husbandry research workers but also others. About three or four decades ago, the concentration was, in the fitness of things, on the bacterial and viral diseases. Since then methods of control had

been developed, with the result that they were fairly in a comfortable position now so far as those diseases were concerned. While much headway had been made in studying the life-history of the parasites, they had not been able to do much by way of controlling the parasitic diseases. It required not only a huge organisation but enormous financial resources. He expressed the hope that the States would do whatever was possible in this regard within the limited resources available.

The Hindu: September 21, 1961.

Paris Leather Fair

Main Attractions

The Leather Fair in Paris which concluded last week was of more than ordinary interest to Madras this year, unlike in the previous years. The Fair was important in that it set the fashion for suedes so to say. Latest reports indicated that a good volume of enquiry was reported with sampling orders from the various manufacturers.

There was very good representation of exhibitors in the Fair, not only from the French trade but also from the manufacturing interests of Germany, Italy, Spain, Finland, Sweden, Britain and America. The lining trade was extremely difficult excepting for "aniline dyed", but manufacturers found difficulty in the matter of prices. In case of "doped linings" for which lower selections of skins are used, demand was more or less absent excepting for limited quantities at very cheap prices with severe competition from the French tanners using Australian sheep skins. Demand for best classes of upper leather was on a fair basis.

Clothing leather

The main interest to Madras was the extremely good demand experienced at the Fair for clothing leather. The fears expressed by the Madras trade interests some weeks ago about the possibility of suedes going out of fashion were completely disproved and the French fashion designers had put up for exhibition, leather clothing finished on the flesh side in very attractive fashionable shades and designs. The fashion in designing showed rather increased length of coats which naturally resulted in the larger consumption of suede leather.

There were some good selections of suede leather tanned from Australian and New Zealand lamb skins and there was keen competition from American tanners. However, in the matter of best qualities, there was nothing to equal Madras hair sheep. The trend of requirements also showed a certain amount of contrast, with the French and Italian designers showing more interest in leather from sheep skins as against goatskins. The absence of many exhibits from India was keenly felt and many operators from various European countries seemed to be completely unaware of the Madras qualities.

The Hindu: September 23, 1961.

Tanneries in Madras State

To be made public utility service

Legislation to declare tanneries in the State as public utility service was now under preparation, said Mr. M. Bhaktavatsalam, Home Minister, during question-hour in the Legislative Assembly.

The Minister told Mr. A. A. Rasheed that as soon as the Bill was ready, it would be brought before the House.

The Hindu: September 25, 1961.

Titan chemical to market scuff-tite

Scuff-tite, a new scuff-resistant leather finish developed in the laboratories of Samuel Smidt Chemical Corp., is now available from Titan Chemical Laboratories, Inc.

"We feel we have hit the ultimate in leather finish", claims Ralph Reback, Titan official. "While scuff-resistance is all important, it is only part of the improvement that comes to your leather when Scuff-tite is used".

Claims made for the product include a marked improvement in the break of even the flankiest piece of leather. It is also claimed that tighter grain and improved break add up to a distinct plus in sorting figures as poorer skins grade up and the entire line takes on a more luxurious appearance.

Scuff-tite, which is actually a prefinish, is said to condition leather so that less regular finish is needed. Another advantage, according to Reback, is the fact that no change in regularly used

finish need be made. "You simply apply Scuff-tite in one easy operation to crust stock prior to normal finishing procedure. From then on you operate in the customary manner with your regular finish. There is a saving in finish, however, as Scuff-tite prepares the leather in such a manner that topcoats go further and give greater coverage."

Titan officials add that Scuff-tite adapts easily to all tannages. The tanner may learn the exact Scuff-tite formula suited to his leather by sending a skin to the laboratories for treatment.

Leather and Shoes: November 19, 1960.

A new type upper leather after five years' research

Barrow, Hepburn and Gale, Ltd., announce the introduction of an entirely new and revolutionary type of upper leather. This is the outcome of the close association between B. H. and G., and Beardmore and Co. of Canada.

This new and important development in upper leather research is now available to the shoe industry in the U.K. under name "Tuftan".

The new method for treating leather, it is claimed, renders the final finish infinitely more resistant to scuff and abrasion, and in addition gives the finished leather a completely tight break.

The process has been developed in North America over a five-year research project, sponsored by a number of leading tanners, and is said to improve the wear factor many times, without losing the other essential characteristics of the leather.

The treatment is an advance in urethane polymers, and changes the physical properties of the grain surface by binding it more closely together.

Another feature is its resistance to staining of white and pastel finishes from internal oils, which will solve a lot of problems in the field of fashion.

Further claim made for this type of leather is that it has many advantages, not only in the finished shoe, but also in the process of manufacturing shoes, in that factory damages to the upper leather are much less likely to occur.

Barrow, Hepburn and Gale have had the leather tested out for the vulcanising process and found it to be perfectly satisfactory.

Leather Trades Review: November 9, 1960.

Tanning limestone grows potatoes well

In these days of money-making diversification, it's heartening to learn of a by-product from the tanning industry which is doing a really big job in converting useless land into ideal potato-growing soil.

The full story appeared in a recent issue of the *Pennsylvania Farmer*, copies of which were sent to **LEATHER AND SHOES** by Lloyd Odhner, Managing Director of the Pennsylvania Chain Store Council.

The editorial tells of the experiments of Dr. E. L. Nixon, an uncle of the Vice-President of the United States, who worked with "limestone plus"—a waste material from a tannery used in chasing flesh from hides in a pre-tanning procedure.

Dr. Nixon reports that a ton of this ground "limestone plus" was applied to each acre of some land not farmed for 75 years. These plots then yielded as much in potatoes as plots which received six tons of regular ground limestone and, further, had undergone a two-year preparation period.

The doctor says of the experiment: "It is the most mysterious thing I have ever seen. This makes no sense at all." But he has proof, and it's well documented.

The next question: how come? Dr. Nixon hopes that question will be answered soon by a tanning chemist.

Leather and Shoes: November 26, 1960.

Surface active agents for dyeing leather

Three surface active agents of the Amphoteric family, called Ampholytes, have been marketed by the Raw Materials Division, Guest Industrials Ltd., London, E.C. 3.

Recommended uses in leather processes are in scouring, dyeing, fatliquoring and softening.

Properties listed depend on pH, some having maximum and others minimum value at isoelectric point, between pH 4.5.

For instance solubility is high in water except at the isoelectric point and they are also soluble in lower alcohols and other polar solvents, and dispersible in nonpolar solvents.

Leather Trades Review: December 28, 1960.

Keeping the air sweet in tanneries

Air pollution, in one form or another, has in recent years become a world wide commercial and industrial problem. In the enclosed spaces—factories, warehouses, and the many buildings of industry and commerce—a number of methods to purify air are being used in an effort to solve this problem. Now, for the first time, a very positive step has been taken in this field, so that everyone concerned may work in a clean, fresh atmosphere free from unpleasant odours at all times—this is the Fume-O-Dor automatic diffuser.

Three years of exhaustive research, and overcoming almost insurmountable technical difficulties, have now been resolved into the putting together three vital factors for making air clean and fresh. They are: (1) A re-circulating fan; (2) Mechanism for diffusing into the air a pre-arranged measured quantity of atomised fluid; and (3) A time control to diffuse the fluid into the air at measured intervals. These factors working together result in the only air conditioning automatic diffuser of its type in the world.

The Fume-O-Dor unit is operated electrically, costing only a few pence a week to run, and is easily fitted to a ceiling or high up on a wall. It is housed in an attractive shaped case and sprays a finely atomised mist of the required fluid at pre-determined intervals into the atmosphere, keeping it in suspension and re-circulating the air at the same time.

A variety of Fume-a-spray fluids used with the Fume-O-Dor unit is available for a multiplicity of uses. Of all its many uses, the Fume-O-Dor unit has a most important practical value in factories and in the enclosed spaces of industry.

The common cold claims many working hours, and slows production considerably each year, the statistics are well known, and much research has been done to find a practical solution. Now, with the Fume-O-Dor unit, it is possible to scientifically purify air, attack, and effectively control the spread of bacteria in the atmosphere. Minimising infection makes the Fume-O-Dor unit an important contribution to the nation's productivity. Unpleasant manufacturing smells can now be controlled night and day by Fume-O-Dor units.

Leather Trades Review: March 15, 1961.

C.L.R.I. NEWS

C.L.R.I. curing salt

The C.L.R.I. curing salt is specially intended as a substitute for khari salt in dry salting hides and skins. However, emphasis is on the dry salting of the latter since they are largely exported in dry salted condition and are expected to stand long storage. (Hides are generally consumed locally and hence are wet salted). Presently, both khari salt and common salt are being used for dry salting.

A good proportion of earthy matter is always associated with khari salt and this makes the cured skins dirty and unattractive. Also khari salt is often adulterated with additional earthy matter for obtaining increased weight in cured skins since these are sold by weight. The adulteration is facilitated by khari salt itself being dirty in appearance. The adulteration is also useful in covering up the flay cuts. Since khari salt is a natural earthy product, standardising its quality has not been feasible.

Common salt which also is used for dry salting is hygroscopic and absorbs moisture from the atmosphere especially during rainy weather and in humid climatic conditions; the consequent moist condition of the skins promotes bacterial growth leading finally to deterioration of the skins. Hence skins dry salted with common salt do not keep sound for long periods.

The C.L.R.I. curing salt is practically free from the disadvantages mentioned above. Large scale trials have shown that it preserves better than khari salt does. The C.L.R.I. curing salt is a mixture of 55-60 parts of anhydrous sodium sulphate and 45-40 parts of hydrated magnesium sulphate (Epsom salt). These two may be first ground separately and then mixed or mixed together first and then ground properly and uniformly. Sodium sulphate and magnesium sulphate of commercial quality are abundantly available in India.

The C.L.R.I. curing salt would cost about Rs. 27 per 50 kg. at the prevailing Madras market prices. Assuming 3 lb. as the average weight of a raw goat skin and that 15 per cent of the salt (on the green weight of the skin) is used, the approximate cost of curing would be only 11 nP. per skin.

How to use the salt

Normally 15 to 20 per cent of this salt (on the washed weight of the skin) is necessary, 25 kg. of the salt being sufficient for about 100 goat skins.

The fresh skins are freed from adhering flesh and fatty tissue etc. and washed to free from blood and dirt. 10 to 20 per cent of the salt is made into a concentrated solution with a little water; one half of this solution is applied on the flesh side and the other half is applied in two instalments both on the same day or one on the same day and the other on the next day. A few hours after the last application of the salt, the skins may be dried by nailing on board, by hanging on frames or by any other suitable means. Drying in shade is always preferable; drying in scorching midday sun must be avoided. When dry, the skins are brushed on the hair side and stored.

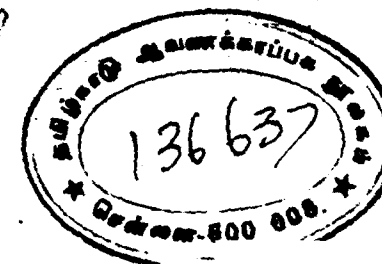
N.B.: The skins should not be folded along the backbone line.

Dr. Y. Nayudamma, Director returned on Sept. 16, 1961, after attending the 7th Biennial Congress of the International Union of Leather Chemists' Societies at Washington (Aug. 20 to 25, 1961) and visiting modern institutions, tanneries and factories in the United States. While returning to India, he visited the International Leather Exhibition held at Paris from Sep. 8 to 13, 1961 and renewed the contacts with a number of continental tanners and traders.

Dr. Y. Nayudamma, Director attended the 33rd meeting of the Committee of Administration of the Leather Export Promotion Council on Sep. 21, 1961.

Dr. S. K. Barat, Assistant Director has been re-elected as a member of the Essentiality Certificate Sub-Committee of the Committee of Administration of the Leather Export Promotion Council, Madras.

797-2021
261-8-3
151



Mr. P. L. Muthiah and Miss Y. M. Theresa reported for duty at C.L.R.I. as CSIR Junior Research Fellows.

Messrs. K. K. Reddy, Koti Udaya Bhanu and G. Jayasingh Thabaraj have been awarded the CSIR Senior Research Fellowships.

Sri K. S. Jayaraman, Senior Scientific Assistant, who has been deputed to U.K. for higher training in 'Oil Tannages' at the Leeds University, for a period of one year under the Colombo Plan, left Madras on Sep. 26, 1961.

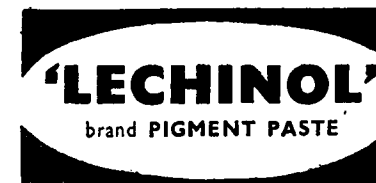
Leather in early days...

Since time immemorial, leather has been playing a vital role, even in its crudest form, in every sphere of our life.

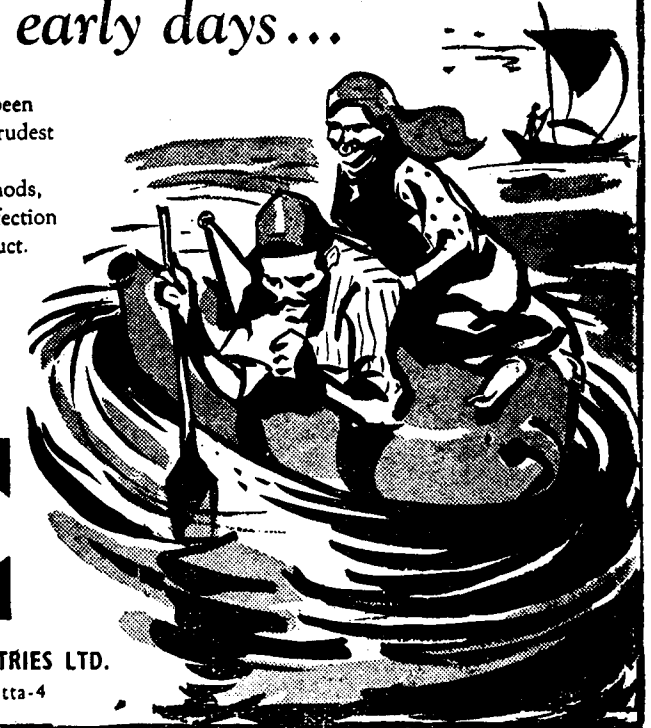
Now under modern scientific methods, no effort has been spared to give perfection to the finish of this versatile product.

Range of Products:-

- Pigment pastes in different shades
- Binders ● Lenol 'C' Fat Liquor
- Resin Top ● Waximul 25
- Top Luster etc.

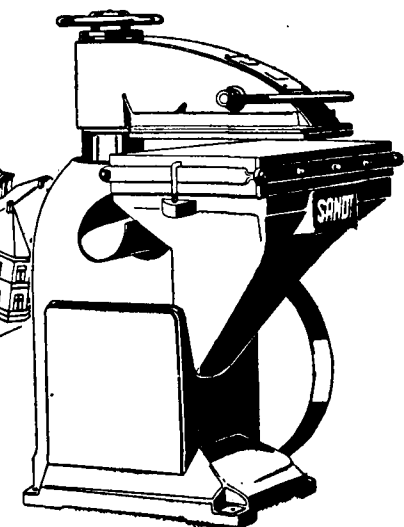
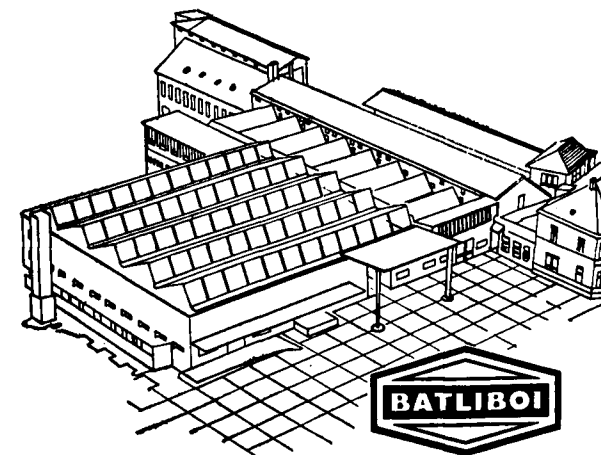


LEATHER CHEMICALS & INDUSTRIES LTD.
9, Muraripukur Road, Calcutta-4



SANDT

Clickers click the world over



BHOJIL LEHERCHAND PRIVATE LTD
Proprietors of **BATLIBOI & COMPANY** Forbes Street, Bombay I
Branches all over India

Editor Y. Nayudamma, Published by N. Subramaniam, on behalf of the Central Leather Research Institute, Adyar, Madras-20. Printed by S. Ramaswami, at The G. S. Press, 21, Narasingapuram Street, Mount Road, Madras.

For outstanding results
in Leather Processing

PRIMAL FINISHES

of
ROHM & HAAS
COMPANY (U.S.A.)

and

CHARLES LENNING & CO. (U.K.)

Because of their inherent flexibility
and remarkable filling and levelling
power, The Primals are ideal for the
finishing of many leathers.

Represented in India by:

AMRITLAL & CO. PVT. LTD.

11, Spratt Road, Bombay I.

QAG-1

**A BINNY product is your guarantee of
quality and consistent results**

Buy

BINNYS

Sodium Bichromate
Chrome Oxide Green
Sodium Chromate

Basic Chrome Tan
Chromic Acid
Ammonium Bichromate

Manufactured by:

The Buckingham & Carnatic Co. Ltd., Madras
(A BINNY COMPANY)

Selling Agents:

M/s T. T. Krishnamachari & Co., M/s Chemicals & Solvents (P) Ltd.,
Madras :: Bombay :: Delhi Calcutta

The India Leather Corporation Private Limited

"INDIA LEATHER MANSIONS"

G. P. O. Box No. 1516

No. 9, DAVIDSON STREET, MADRAS-1

Telegram: "TANDRIGHT"

Phone: 4491

PREMIER EXPORTERS OF E. I. TANNED SKINS & HIDES



**Largest individual Foreign Exchange Earners in the Southern
Region**

YEARLY EXPORTS EXCEED RUPEES TWO CRORES

Enquiries invited from all parts of the world for East India Tanned

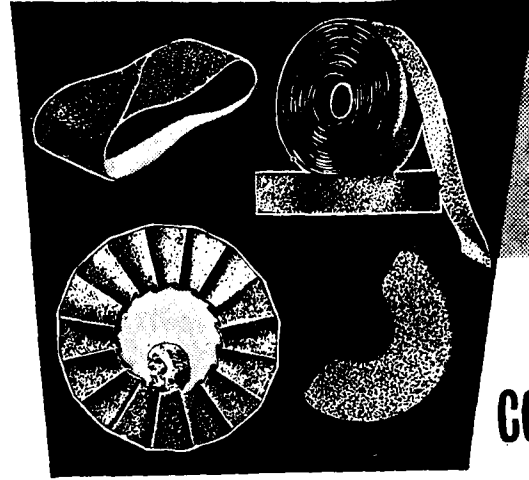
GOAT SKINS
SHEEP SKINS

COW HIDES
BUFF HIDES

COW CALF
BUFF CALF

Coated Abrasives
in the Leather Industry

Put a
fine finish to
Leather



with
**CARBORUNDUM
UNIVERSAL
COATED ABRASIVES**

Get that superfine finish on your leather and leather products, by using Carborundum Universal 'Silicon Carbide' and 'Aloxite' coated abrasives. They are manufactured by the most modern method of Electrostatic coating...and what's more, they are so sharp that they cut the soft yielding surface of leather without tearing or pulling and give the product the desired finish. Available in various shapes as rolls, belts, naumkegs, truncated cones, etc.

COATED ABRASIVES:
Flint (Sand), Garnet, Emery, 'Aloxite' and Silicon Carbide, in sheets, rolls, belts, discs, converted shapes, etc., available in various backings like paper, cloth, fibre and combinations. Also special products of Silicon Carbide Water-proof Abrasive paper reams and Aloxite Resin Sander discs.

CARBORUNDUM UNIVERSAL LTD.

Head Office: 52/53, Jehangir Street, Madras-1
Telephone: 29141 (8 lines) Works: Tiruvottiyur.

Branch: United India Building, Sir Phirozsha Mehta Road, Bombay-1

Distributors: For Maharashtra and Gujarat, part of Madhya Pradesh and part of Rajasthan: M/s. ABRAWHEEL PRIVATE LTD., 107, Sarang Street (Bhusari Mohalla) Near Crawford Market, Bombay-3. Branch: 1-2-3, Gaikwadi Road, Junction Plot, Rajkot. For Madras, Pondicherry, Andhra Pradesh, Mysore and Kerala States: M/s. R. SUBBARAMAN & CO. PRIVATE LTD., Vanguard House, 11/12, Second Line Beach, Madras-1, 141, Rashtrapathi Road, Secunderabad. For Delhi, Punjab, Uttar Pradesh, Jammu and Kashmir, Ajmer and Northern Area in Rajasthan: M/s. S. N. SUNDERSON & CO., 1, Deshabandu Gupta Road, New Delhi, 76/44, Halsey Road, P. B. 88, Kanpur. For West Bengal, Bihar, Orissa, Assam and part of Madhya Pradesh area between Raipur and Jabalpur: M/s. WILLIAM JACKS & CO., LTD., 16, Netaji Subhas Road, Calcutta-1.

சென்ட்ரல் லெதர் ரிசர்ச் இன்ஸ்டிடியூட் புல்லட்டின்
இணைப்பு ஏடு, அக்டோபர், 1961.

வெண்மை குரோம் 'நுபக்' தோல் தயாரித்தல்
கே. ராஜாபாதர், என். பாலகுருநாதன், பி. எஸ். வெங்கடாசலம்

முன்னுரை

வெண்மைக் குரோம் 'நுபக்' தோல் நல்ல வெண்மையான மேற்பரப்பைக் கொண்டதாகும். இது குரோம் பதனிடப்பட்டது என்பது அறுவை பாகத்தைப் (Cut Section) பார்க்கும்போதே தெளிவாகத் தெரியும். இத்தோல், இதன் வெண்மை நிறத்திற்கு ஊறு ஏற்படாத வகையில், சவ்வுப் பக்கத்திலும், மேனிப்பக்கத்திலும் கல்லடிப்பதற்கு ஏற்ற இயல்புடையதாக இருக்க வேண்டும்.

இதன் வெண்மை நிறம், தோலை எந்த விதத்திலும் கெடுக்காத மிகக் குறைவான அளவு வண்ணங்களால் பெறப்பட வேண்டியது ஒன்றாகும் என்பது இங்கு கவனித்தற்குரியது. மேற்கூறிய தன்மைகளைக் கருத்தில் கொண்டு, கீழ்க்கண்ட முறை மேற்கொள்ளப்பட்டது.

முறை விளக்கம்

கச்சாப் பொருள் (Raw material):

மேனிப் போக்கற்றதும், இலேசான நடுத்தர வகைப் பச்சைத் தோல்களும், உப்புத் தோல்களும் எடுத்துக் கொள்ளப்படுகின்றன. மேலெழுந்த வாரியாகக் காணப்படும் கீறல்களைப் பொருட்படுத்தத் தேவையில்லை. மொத்தம் 80 ராத்தல் (36.29 கி. கிராம்) எடையுள்ள 6 உப்புத் தோல்கள் இந்நிலையத்தில் நடைபெற்ற விளக்கத்தின்போது எடுத்துக் கொள்ளப்பட்டன. கணக்கிடுவது சலபமாக இருக்குமாதலால் இவ்வெடை 100 ராத்தல், அதாவது 45.36 கி. கிராம் என்று கொள்ளப்பட்டது.

நனைவு : (soaking)

உப்புத் தோல் எடையில் 500% தண்ணீரில் 30 நிமிடத் திற்கு ஒரு தடவை வீதம் நான்கு தடவை தண்ணீர் மாற்றப் பட்டு இத்தோல்கள் கழுவப்படுகின்றன. பின்னர் $\frac{1}{2}$ மணி நேரத்திற்குப் பட்டறையாக விடப்பட்டு வடிய வைக்கப்படு கின்றன.

முடி நீக்கும் பூச்சு (painting) :

கீழ்க்கண்ட அளவில் ஒரு பூச்சுத் தயாரிக்கப்படுகிறது. (சதவீதங்கள் உப்புத் தோல் எடைக்குக் கணக்கிடப்பட் டவையாகும்.)

முதலில் 20% தண்ணீரில் 2% சோடியம் சல்பைடு (Sodium sulphide-60% காரமுள்ளது) கரைக்கப்படுகிறது. பின்னர் இவ்விரண்டு கரைசல்களும் ஒன்றாகக் கலக்கப்பட்டு, அத்துடன் 24% சுண்ணாம்புக் குழம்பு அல்லது 12% தாளித்த சுண்ணாம்பு கலக்கப்படுகிறது. (12% தாளித்த சுண்ணாம்பு கலக்கப்படுவதாக இருந்தால் சுமார் 10% - 12% தண்ணீர் அதிகம் சேர்த்துக் கொள்ளவேண்டும்.)

பிறகு இப்பூச்சு தோல்களின் மேனிப்பக்கத்திலும், சவ்வுப்பக்கத்திலும் தடவப்பட்டு, சவ்வுப்பக்கம் வெளிப்புற மாக இருக்குமாறு முதுகின் நடுவே இரண்டாக மடிக்கப் பட்டு, இரவு முழுதும் பட்டறையாக விடப்படுகின்றன.

குறிப்பு : பூச்சுக் கலவையில் சோடியம் ஹைட்ரோசல் பைடு உபயோகிப்பதால் வெண்மையான சுண்ணாம்புத் தோல் கிடைக்கிறது.

சுண்ணாம்பிடுதல் (Liming) :

மறுநாள் காலை யில் ஒரு குழியில் 400% தண்ணீரில் 3% சுண்ணாம்புக் குழம்பு அல்லது $1\frac{1}{2}$ % தாளித்த சுண்ணாம்புத் தூள் கரைக்கப்படுகிறது. தோல்கள் இக்குழியில் தள்ளப் பட்டு, ஒரு தடவை குழி திருப்பப்படுகின்றன. பின்னர் மாலையில் இவை வெளியே எடுக்கப்பட்டு, முடி தள்ளப் பட்டு, கழுவப்பட்டு, சல்லா சீவப்பட்டு, சுற்றுப் பார்க்கப் பட்டு நிறுத்துக் கொள்ளப்படுகின்றன. (சுண்ணாம்புத் தோலின் எடை 72 ராத்தல் அதாவது 32.66 கி.கிராம்.)

பின்னர் 400% தண்ணீர் கொண்ட ஒரு குழியில் 3% சுண்ணாம்புக் குழம்பு கரைக்கப்பட்டு, தோல்கள் இக்குழியில் தள்ளப்பட்டு, அன்றிரவு முழுதுமன்றி மறுநாள் முழுதும் இவை இக்குழியிலேயே விட்டு வைக்கப்படுகின்றன. ஒரு நாளைக்குக் குறைந்தது ஒரு தடவையாவது குழி திருப்பப்படு

கின்றன. 4-ம் நாள், ஒன்று அல்லது இரண்டு கையளவு சுண்ணாம்பு வேறொரு குழியிலுள்ள புதிய தண்ணீரில் கரைக் கப்பட்டு, அக்குழியில் இத்தோல்கள் தள்ளப்படுகின்றன. (இக்குழியில் சுண்ணாம்பு சேர்ப்பதன் நோக்கம் தண்ணீரின் தற்காலிகக் கடினத் தன்மையால் தோல்கள் பாதிக்கப்படா மல் செய்வதேயாகும்.) மூன்று மணி நேரத்திற்குப் பிறகு இவை வெளியே எடுக்கப்பட்டு பாளங்களாக்கப்பட்டு, 2.00 மி. மீடர் கனத்திற்குப் பிளக்கப்படுகின்றன (Split). இவ் வாறு பிளக்கப்பட்ட பாளங்கள் பின்னர் நிறுக்கப்பட்டு, சுத்தமான தண்ணீரில் இரவு முழுதும் விட்டு வைக்கப்படு கின்றன. பிளவுப் பாளங்களின் (Split sides) எடை 55 ராத் தல் அல்லது 24.95 கி. கிராம்.)

சுண்ணாம்பு நீக்கம் (இளங்காரம்) :

5-ம் நாள் இப்பாளங்கள் கழுவப்பட்டு, கார் வாங்கப்படு கின்றன. பின்னர் ஒரு பீப்பாயில் 200% தண்ணீர் நிரப்பப் பட்டு அதில் $\frac{1}{2}$ % அமோனியம் சல்பேட் (Ammonium sulphate) கரைக்கப்படுகிறது. இப்பீப்பாயில் இப்பாளங்கள் போடப்பட்டு, பீப்பாய் சுமார் $\frac{1}{2}$ மணி நேரத்திற்கு இயக் கப்படுகிறது. பிறகு $\frac{1}{2}$ % பார்மிக் அமிலம் போதுமான அளவு தண்ணீரில் நீர்க்கப்பட்டு, இப்பீப்பாயில் சேர்க்கப்பட்டு, பீப் பாய் மறுபடி 15 நிமிடங்களுக்கு இயக்கப்படுகிறது. இப் போது பிளாப்தலீன் (Phenolphthalein) உபயோகித்து சுண் ணாம்பு நீக்க (இளங்காரம்) அளவு பரிசோதிக்கப்படுகிறது. பாளங்களின் கனத்தில் மேனிப்பக்கத்திலிருந்து $\frac{1}{2}$ பாகத்தி லும், சவ்வுப்பக்கத்திலிருந்து $\frac{1}{2}$ பாகத்திலும் சுண்ணாம்பு நீக்கம் நடைபெற்றிருக்க வேண்டும்.

பின்னர் பீப்பாயிலுள்ள திரவம் காலி செய்யப்படுகிறது. மறுபடி இப்பீப்பாயில் 200% வெந்நீர் (40° செண்டிகிரேடு) நிரப்பப்பட்டு, அதில் $\frac{1}{2}$ % சி. எல். ஆர். ஐ. பேட் நம்பர்-2 (C. L. R. I. Bate No. 2.) கரைக்கப்படுகிறது. பீப்பாய் பின் னர் $\frac{1}{2}$ மணி நேரத்திற்கு இயக்கப்படுகிறது. பிறகு பாளங்கள் வெளியே எடுக்கப்பட்டு, கார் வாங்கப்பட்டு, அதே பீப்பா யில் கழுவப்பட்டு வெளுக்கப்படுகின்றன.

வெளுத்தல் (Bleaching) :

கீழ்க்கண்ட பொருள்களைக் கொண்டு வெளுக்கும் கலவை தயாரிக்கப்படுகிறது.

தண்ணீர்	75%
உப்பு	5%
பொட்டாசியம் பர்மாங்கனேட்	$\frac{1}{2}$ %

இக்கலவை பீப்பாயில் நிரப்பப்பட்டு, பாளங்கள் அதில் போடப்பட்டு, பீப்பாய் $\frac{1}{2}$ மணி நேரத்திற்கு இயக்கப்படுகிறது. பின்னர் பாளங்கள் வெளியே எடுக்கப்பட்டு, சுத்தமான தண்ணீரில் அலசப்படுகின்றன. பின்னர் பீப்பாயில் 75% தண்ணீர் நிரப்பப்பட்டு, 2% சோடியம் பைசல்பைட்டு (Sodium bisulphite) அதில் கரைக்கப்படுகிறது. பாளங்கள் இப்பீப்பாயில் போடப்பட்டு, பீப்பாய் $\frac{1}{2}$ மணி நேரத்திற்கு இயக்கப்படுகிறது.

உப்பு அமில நீரில் ஊற வைத்தல் (Pickling) :

ஒரு பீப்பாயில் 100% தண்ணீர் நிரப்பப்பட்டு, அதில் 10% உப்பும், 2% பார்மிக் அமிலமும் கலக்கப்படுகின்றன. பாளங்கள் இப்பீப்பாயில் போடப்பட்டு, பீப்பாய் 1 மணி நேரத்திற்கு இயக்கப்படுகிறது. பின்னர் இரவு முழுவதும் இவை இப்பீப்பாயில் உள்ள உப்பு அமில நீரில் நன்றாக மூழ்கி இருக்குமாறு விட்டு வைக்கப்படுகின்றன. மறுநாள் காலை பீப்பாய் 5 நிமிடங்களுக்கு இயக்கப்பட்ட பின் நாள் முழுதும் இவை இப்பீப்பாயிலேயே விட்டு வைக்கப்படுகின்றன.

குறிப்பு :—நல்ல வெண்மையான தோல்கள் பெறுவதற்காகவே, இப்பாளங்கள் இவ்வாறு வெளுக்கப்பட்டு, உப்பு அமில நீரில் ஊற வைக்கப்பட்டன.

முன் பதனிடுதல் (Pretanning) :

7-ம் நாள் ஒரு பீப்பாயில் 75% தண்ணீர் நிரப்பப்பட்டு, அதில் 3% உப்பும், 3% 'டானிகான் சுப்ரா எல். ஹெச்' தூளும் (Tanigan supra L H Powder Farben Fabriken Bayer) கலக்கப்பட்டு, பாளங்கள் பீப்பாயில் போடப்பட்டு, பீப்பாய் $1\frac{1}{2}$ மணி நேரத்திற்கு இயக்கப்படுகிறது. பிறகு 2% குரோம் சாரக்கட்டி (B. and C. Co.) தேவையான அளவு தண்ணீரில் குறைந்தது ஒரு நாள் முன்னதாகவே கரைக்கப்பட்டு, பீப்பாயில் உள்ள திரவத்துடன் கலக்கப்படுகிறது. பீப்பாய் பிறகு ஒரு மணி நேரத்திற்கு இயக்கப்படுகிறது. பிறகு 2% சி. எல். ஆர். ஐ. பேசிக் அலுமினியம் சல்பேட் (50% காரம் உள்ளது) பீப்பாயில் சேர்க்கப்பட்டுப் பீப்பாய் பின்னும் $1\frac{1}{2}$ மணி நேரத்திற்கு இயக்கப்பட்டு, பின்னர் இரவு முழுதும் பாளங்கள் இப்பீப்பாயிலேயே விட்டு வைக்கப்படுகின்றன. பேசிக் அலுமினியம் சல்பேட்டுக்கு பதிலாக 3% படிக் காரத்தை (பொட்டாஷ் ஆலம்) உபயோகிக்கலாம்.

மறுநாள் பீப்பாய் 5 நிமிடங்களுக்கு இயக்கப்பட்ட பின் பீப்பாய் காலிசெய்யப்படுகிறது. பாளங்கள் மரக்குதிரைகளின் மீது 1-2 நாட்களுக்கு விட்டு வைக்கப்படுகின்றன. பிறகு

இவை 1.20 மி. மீடர் கனத்திற்குச் சீவப்பட்டு நிறுக்கப்படுகின்றன. (இப்போது இவற்றின் எடை 40 ராத்தல்: அதாவது 18.14 கி. கிராம்) (இதற்குப் பிறகு செய்யப்படும் வேலைகளில் கொடுக்கப்பட்ட சதவீதங்கள் இந்த எடைக்கே கணக்கிடப்பட்டவையாகும்.) பின்னர் இவை கழுவப்பட்டு, அமில வலிமை முறிக்கப்படுகிறது. கழுவும் வேலை 500% சுத்தமான தண்ணீர் நிரம்பிய பீப்பாயில் 15 நிமிடங்களுக்கு நடைபெறுகிறது.

அமில வலிமை முறித்தல் (Neutralisation) :

உபயோகத்துக்கான பொருள்கள் :

தண்ணீர்	200%
ஹைபோ	8%

முதலில் 4% ஹைபோ 200% தண்ணீரில் கரைக்கப்பட்டு, இது பீப்பாயில் நிரப்பப்படுகிறது. பின்னர் பாளங்கள் பீப்பாயில் போடப்பட்டு, பீப்பாய் $\frac{1}{2}$ மணி நேரத்திற்கு இயக்கப்படுகிறது. பின்னர் மறுபடி 4% ஹைபோ பீப்பாயில் சேர்க்கப்பட்டு, பீப்பாய் மறுபடி $\frac{1}{2}$ மணி நேரத்திற்கு இயக்கப்படுகிறது. பின்னர் இவை 3 தடவை தண்ணீர் மாற்றிக் கழுவப்படுகின்றன. ஒவ்வொரு தடவையும் 10 நிமிடங்கள் கழுவப்படுகின்றன.

வெளுத்தல் (Bleaching) :

தேவையான பொருள்கள் :

தண்ணீர்	100%
டானிகான் சுப்ரா எல். ஹெச் தூள்	6%
(Tanigan supra L H Powder)	
ஆக்சாலிக் அமிலம்	$\frac{1}{2}$ %

6% 'டானிகான் சுப்ரா எல். ஹெச்' தூள் 100% தண்ணீரில் கரைக்கப்பட்டு, இக்கரைசல் ஒரு பீப்பாயில் ஊற்றப்படுகிறது. பாளங்கள் இப்பீப்பாயில் போடப்பட்ட பின் பீப்பாய் ஒரு மணி நேரத்திற்கு இயக்கப்படுகிறது. பிறகு $\frac{1}{2}$ % ஆக்சாலிக் அமிலம் பீப்பாயில் சேர்க்கப்பட்டு, பீப்பாய் பின்னும் $\frac{1}{2}$ மணி நேரத்திற்கு இயக்கப்படுகிறது. பிறகு பாளங்கள் வெளியே எடுக்கப்பட்டு, மேனிக்கு மேனியாகப் பட்டறையாக இரவு முழுதும் விட்டு வைக்கப்படுகின்றன.

எண்ணெய் ஊட்டுதல் (Fat liquoring) :

எண்ணெய் ஊட்டுவதற்கென மாறுபட்ட கலவை முறைகள் இரண்டு கீழே கொடுக்கப்பட்டுள்ளன. இதில் ஏதாவது ஒன்றைக் கையாளலாம்.

கலவை (அ)	50° சென்டிகிரேடு வெந்நீர் சல்பேட் செய்யப்பட்ட தேங்காய் எண்ணெய்	100% 2%
கலவை (ஆ)	45° சென்டிகிரேடு வெந்நீர் சி. எல். ஆர். ஐ. 'காடயானிக்' எண்ணெய் திரவம் C.L. R.I. Cationic fat liquor)	100% 3%

முதலில் குறிப்பிட்ட சதவீதம் வெந்நீர் பீப்பாயில் நிரப்பப்படுகிறது. பின்னர் தோல்கள் பீப்பாயில் போடப்பட்டு, மேற் குறிப்பிட்ட சதவீதம் எண்ணெய்க் கலவை பீப்பாயில் ஊற்றப்பட்டு பீப்பாய் 45 நிமிடங்களுக்கு இயக்கப்படுகிறது.

குறிப்பு : கலவை 'அ' உபயோகிக்கப்பட்டால் விரைப் பில்லாத துவண்ட தோல் அல்லது கொஞ்சம் விரைப்புள்ள தோல் கிடைக்கும். கலவை 'ஆ' உபயோகிக்கப்பட்டால் விரைப்பானதும் நல்ல வெண்மை நிறங் கொண்ட மேற் பரப்பைக் கொண்ட தோல் கிடைக்கும்.

ஒப்பனை (Finishing) :

பின்னர் பாளங்கள் வெளியே எடுக்கப்பட்டு, இவற்றின் மேனிப்பக்கத்திலும் சவ்வுப்பக்கத்திலும் 2% சைனாக்ஸைட் மண்ணும், 2% டிடானியம் டையாக்சைடும் (Titanium dioxide) தேவையான அளவு தண்ணீரில் குழம்பாகக் கலக்கப்பட்டு, பூசப்படுகிறது. பிறகு இவை ஒரு காலிப் பீப்பாயில் போடப்பட்டுப் பீப்பாய் ஒரு மணி நேரத்திற்கு இயக்கப்படுகிறது. பின்னர் இரவு முழுதும் மரக் குதிரைகளின் மேல் விட்டு வைக்கப்படுகின்றன.

மறுநாள் இவை நன்றாகத் தண்ணீர் தள்ளப்பட்டு (Struck out), முதலில் இயந்திரத்தாலும், பிறகு கையாலும் சுருக்கம் (தாண) தள்ளப்படுகின்றன. பிறகு உலர்வதற்காகத் தொங்கவிடப்படுகின்றன.

இவை உலர்ந்த பிறகு 2-3 நாட்களுக்கு உலர்ந்த (Crust) நிலையிலேயே விட்டு வைக்கப்படுகின்றன. பிறகு பின் கண்டவாறு பக்குவப்படுத்தப்படுகின்றன. ½% கிளிசரின் கரைசல் பாளங்களின் மேனிப்பக்கத்திலும் சவ்வுப்பக்கத்திலும் இயந்திரத்தால் தெளிக்கப்பட்டு, இவை பாய் போல் சுருட்டப்பட்டு இரவு முழுதும் மூடி வைக்கப்படுகின்றன.

மறுநாள் இவை இயந்திரத்தில் மிருதுவாக்கப்பட்டு, இழுத்துப் பிடிக்கும் கிடுக்கிகள் உள்ள சட்டத்தில் மாட்டப்

படுகின்றன (Toggled), அல்லது ஆணி அடிக்கப்படுகின்றன. உலர்ந்த பிறகு, இவை சட்டத்திலிருந்து எடுக்கப்பட்டு சுற்றுப் பார்க்கப்பட்டு, முதலில் சவ்வுப் பக்கத்திலும் பிறகு மேனிப்பக்கத்திலும் 240 எண் உப்புத் தாளால் கல்லடிக்கப்படுகிறது. பிறகு மேனிப்பக்கத்தில் மட்டும் 400 எண் உப்புத் தாளால் கல்லடிக்கப்படுகிறது. (பாளங்கள் ஒரே சீரான கனம் கொண்டவையாய் இல்லாவிட்டால் கல்லடிப்பதற்கு முன் ஒரு தடவை இவைகளைச் சீவிக் கொள்ளலாம்.) பின்னர் இவை தூசி தட்டப்பட்டுத் தரவாரியாகப் பிரிக்கப்படுகின்றன.

இம்முறையில் கிடைத்த ஒப்பனைத் தோலின் பரப்பளவு 96 சதுர அடியாகும்.

குறிப்பு : பாளங்களுக்கு வண்ணம் ஊட்ட வேண்டுமென்ற விருப்பம் இருப்பின் 2:1 என்ற விகிதத்தில் அல்லது தேவையான அளவில் கலக்கப்பட்ட சைனாக் களி மண்ணும், துத்தநாக ஆக்ஸைடும் பாளங்களின் மேனிப் பக்கத்திலும், சவ்வுப்பக்கத்திலும், கல்லடிப்பதற்கு முன்னும், பின்னும் தடவப்படலாம்.

செய்திக் கதிர்

ஐ. எஸ். ஐ. குறியீடுகள்

(I. S. I. Specifications.)

குரோம் பதனிட்ட மெழுகுக் காலணி அடித் தோலுக் கான (Chrome waxed sole leather) 1960-ம் ஆண்டுத் தரக் குறியீடு - 1636.

இந்தியாவில் குரோம் பதனிட்ட மெழுகுக் காலணி அடித் தோல்கள் எருமைத் தோல் அல்லது கனமான எருதுத் தோல்களிலிருந்து தயாரிக்கப்படுகின்றன. இத்தகைய தோல்கள் தயாரிப்பதற்கு ஒரு படி (one-bath) குரோம் பதனிடு முறை பின்பற்றப்படுகிறது. இதன் பிறகு இத் தோல்களில், ரோசின் கலந்தோ, கலக்காமலோ, கெட்டியான கொழுப்புக்கள் அல்லது மெழுகுகள் சூடான நிலையில் திணிக்கப்படுகின்றன. இவ்வாறு ஒப்பனை செய்யப்பட்ட தோல்கள் தண்ணீரை உறிஞ்சாதனவாயும் வழக்காதனவாயும், தேயாத தன்மை படைத்தனவாயும் இருக்கின்றன. மெழுகுத் திணிப்பால் தோல் கெட்டியாவதுடன் தண்ணீர் ஊடுருவிச் செல்ல முடியாத நிலையும் ஏற்படுகிறது. ஆனால் தைக்கும்போது எவ்விதத் தடையும் ஏற்படுவதில்லை. இது சாதாரண குரோம் காலணி அடித் தோல்கள், தாவரப் பதனிட்ட காலணி அடித் தோல்களை விட அதிகம் உழைக்கிறது.

கிழக்கிந்திய முறைப்படி பதனிடப்பட்ட தோல்கள்

ஒரு நூற்றாண்டுக்கும் மேலாக, கிழக்கிந்திய முறைப்படி பதனிடப்படும் தோல்கள் இந்தியாவுக்கு, குறிப்பிடத்தக்க அளவில் அந்நியச் செலாவணி தேடி அளித்து வருகின்றன. இதன் மூலம் அரசாங்கத்திற்கு ஆண்டுதோறும் 2500 லட்சம் ரூபாய் வருமானம் கிடைக்கிறது. இப்பெரும் வருமானத்தை நம் நாட்டுக்கு அளிக்கும் இந்தத் தோல்களின் ஏற்றுமதித் தொழில் எந்த விதமான தடங்கலுமில்லாமல் நல்ல முறையில் நடைபெற வேண்டுமானால், தரக்கட்டுப்பாட்டின் மூலம் தோல்களின் தரம் குறையாமல் பார்த்துக் கொள்ளவேண்டு வது மிக்க அவசியம். இத்தோல்களின் ஏற்றுமதி 100 ஆண்டு களுக்கும் மேலாக நடைபெற்று வருகிறது என்பது ஒன்றே,

இத்தொழிலில் தரக்கட்டுப்பாடும், தரவாரியாகப் பிரித்தலும் ஏதோ ஒரு முறையில் இருந்து வருகிறது என்பதைக் காட்டுகிறது. உண்மையிலேயே இத்தகைய தரக் கட்டுப்பாடும், தரவாரியாகப் பிரித்தலும் நடை முறையில் இருப்பினும் அது ஆண்டாண்டு காலமாக, பரம்பரை பரம்பரையாக வந்துள்ளதேயாகும். ஆயினும் அனுபவத்தின் வாயிலாகக் கிடைத்துள்ள இத்தகைய அறிவு விஞ்ஞானக் கலப்பற்றதாயிருக்கிறது. விஞ்ஞான ஆராய்ச்சிகளின் பலன்களை இவ்வனுபவத்துடன் இணைத்து, இத்தோல்களின் ரசாயன குணங்கள் பற்றிய விவரங்களையும், தரக் குறியீடுகளையும் தன்னில் சேர்த்துக் கொள்வதாக இவ்வனுபவம் அமைய வேண்டும்.

நாள்தோறும் அதிகரித்துவரும் உற்பத்தியையும், வெளி நாட்டிலும் உள் நாட்டிலும் இதன் தேவையையும் எண்ணும் போது ஒரே தரமான இத்தோல்கள் உற்பத்தி செய்யப்படுவதற்கான அடிப்படைத் தேவைகளைக் குறியீடு செய்வதன் அவசியத்தை உணரலாம்.

மேற்கூறிய இரண்டு குறியீடுகளும் ஆங்கிலத்தில் வெளியிடப்பட்டுள்ளன. இவற்றின் குறியீட்டு எண்கள் முறையே ஐஎஸ் : 1636-1960; ஐஎஸ் : 1639-1960 ஆகும். இக்குறியீடு ஒவ்வொன்றின் விலை ரூ. 1-50 ஆகும்.

நிலையச் செய்திகள்

தோலைப் பக்குவப்படுத்துவதற்கான (curing)

சீ. எஸ். ஆர். ஐ. உப்பு

தோலைப் பக்குவப்படுத்துவதற்கான ஒரு உப்பு இந் நிலையத்தில் தயாரிக்கப்பட்டிருக்கிறது. இவ்வுப்பு, காரி உப்புக்கு பதிலாக உப்புவறை (Dry salting) செய்வதற்கெனத் தனிப்படத் தயாரிக்கப்பட்டதாகும். இவ்வுப்பை உபயோகித்து ஆடு, மாடுகளின் தோல்களையும் இதரத்தோல்களையும் உப்புவறை செய்யலாம். எனினும் உப்புவறை செய்வதில் ஆட்டுத் தோல்களுக்கே முதலிடம் அளிக்கப்படுகிறது. ஏனெனில் மாட்டுத் தோல்கள் உள் நாட்டிலேயே பதனிடப்படுகின்றன. எனவே இவைகளை 'ஈர உப்பு' (Wet salting) செய்தாலே போதுமானது. ஆனால் ஆட்டுத் தோல்கள் பெரு வாரியாக உப்புவறை செய்யப்பட்டே வெளி நாடுகளுக்கு அனுப்பப்படுகின்றன. உப்புவறைத் தோல்கள் வெளி நாடுகளிலுள்ள வியாபாரிகளுக்குப் போய்ச் சேருவதற்கு நீண்ட காலம் பிடிக்கிறது. எனவே இத்தோல்கள் நீண்ட காலத்திற்குப் பக்குவப்படுத்திய நிலையில் இருப்பது அவசியமாகிறது. வழக்கமாகத் தோல்களை உப்புவறை செய்வதற்கு 'காரி' உப்பு அல்லது சாதாரண உப்பையே உபயோகிக்கிறார்கள்.

காரி உப்பு மண்ணிலிருந்து எடுக்கப்படுகிறது. எனவே இதைக் கொண்டு பக்குவப்படுத்தப்பட்ட தோல்கள் அழுக்காகவும், கவர்ச்சியற்றவையாயும் இருக்கும். இயற்கையிலேயே மண்ணுடன் கலந்து கிடைக்கும் காரி உப்புடன் மேலும் மண் கலக்கப்பட்டுத் தோலின் மேல் தடவப்படுகிறது. தோல்கள் எடைக் கணக்கிலேயே விற்கப்படுவதால், அவற்றின் எடையைப் பெருக்கிக் காட்டுவதற்காகவே இத்தகைய வழி மேற் கொள்ளப்படுகிறது. மேலும் தோல்களில் காணப்படும் உறிவடுக்களை (fatty cuts) மூடி மறைப்பதும் இதன் மற்றொரு நோக்கமாகும். பூமியிலிருந்து எடுக்கப்படுவதால் இவ்வுப்பின் தரத்தைக் குறியீடு செய்வது எளிதல்ல.

சாதாரண உப்பு இயற்கையிலேயே காற்றிலுள்ள நீரை உட்கொண்டு கசியும் தன்மை படைத்தது. மேலும் மழை காலங்களிலும், காற்று ஈரப்பனம் கொண்டதாக இருக்கும்

காலங்களிலும் இது அதிகம் கசிவதால் தோல்களை ஈரமாக்குகிறது. இதனால் தோல்களில் கிருமிகளின் வளர்ச்சிக்கும் பெருக்கத்துக்கும் இடமேற்பட்டுக் கடைசியில் தோல்கள் அழுகத் தொடங்குகின்றன. எனவே சாதாரண உப்பை உபயோகித்து உப்புவறை செய்த தோல்களை நீண்ட காலம் பக்குவப்படுத்திய நிலையில் பாதுகாக்க முடிவதில்லை.

இந்நிலையத்தில் தயாரிக்கப்பட்டுள்ள பக்குவப்படுத்தும் உப்பில், காரி உப்பிலும், சாதாரண உப்பிலும் காணப்படும் குறைபாடுகள் இல்லை. பெரிய அளவில் சோதனைகள் செய்து பார்த்ததில் இவ்வுப்பு, காரி உப்பைவிடத் தோல்களைச் சிறந்த முறையில் பக்குவம் செய்கிறது என்று அறியப்பட்டது. இவ்வுப்பு 50-60 பாகம் நீரற்ற சோடியம் சல்பேட்டையும் (Anhydrous sodium sulphate) 40-45 பாகம் எப்சம் உப்பையும் (Hydrated Magnesium sulphate) கொண்டு தயாரிக்கப்பட்டதாகும். இவ்விரு உப்புக்களும் நம்நாட்டில் நிறையக் கிடைக்கின்றன. இவைகளைத் தனித்தனியே அரைத்துக் கொண்டு பிறகு ஒன்றாகக் கலக்கலாம். அல்லது இரண்டையும் ஒன்று கலந்து அரைத்துக் கொள்ளலாம். இவைகளை ஒரே சீராய் அரைத்துக் கொள்வது மிகவும் அவசியம்.

சென்னையில் தற்போதுள்ள மார்க்கெட் நிலவரப்படி 50 கி. கிராம் சி.எல். ஆர்.ஐ. உப்பின் விலை ரூ. 27-00 ஆகிறது. பச்சை ஆட்டுத்தோல் ஒன்றின் சராசரி எடை 3 ராத்தல் எனவும், இவ்வெடையில் 15 சதவீதம் உப்பு பக்குவப்படுத்த உபயோகிக்கப்படுகிறது என்றும் கொண்டால் இந்த உப்பை உபயோகித்து ஒரு தோலைப் பக்குவம் செய்ய சுமார் 0-11 நயா பைசா தான் செலவாகும்.

இவ்வுப்பை உபயோகிக்கும் முறை

கழுவின தோல்களின் எடையில் சுமார் 15-20 சதவீதம் உப்பு எடுத்துக் கொள்ளப்படுகிறது. 25 கி. கிராம் உப்பை உபயோகித்து சுமார் 100 ஆட்டுத் தோல்களைப் பக்குவப்படுத்தலாம்.

பச்சைத் தோல்களில் ஒட்டிக் கொண்டிருக்கும் இறைச்சி, கொழுப்புத் திசுக்கள் (Fatty tissues) ஆகியவற்றை நீக்கிய பின்னர் தோலிலுள்ள இரத்தம், அழுக்கு இவை போகத் தோல்களைக் கழுவ வேண்டும். பின்னர் 10-20 சதவீத உப்பை எடுத்துக்கொண்டு சிறிதளவு தண்ணீர் சேர்த்து, கெட்டியான நிறை கரைசல் தயாரித்துக் கொள்ள வேண்டும். இக்கரைசலில் பாதி, தோல்களின் சவ்வுப்

பக்கத்தில் தடவப்படுகிறது. மறுபாதி, வசதிக்கேற்ப இரு தவணைகளில் அன்றே தடவப்படலாம். அல்லது அன்று ஒரு தடவையும் மறுநாள் ஒரு தடவையுமாகத் தடவப்படலாம்.

கடைசி முறையாக உப்பைத் தடவிய சில மணி நேரங்களுக்குப் பிறகு தோல்களைப் பலகைகளில் ஆணி அடித் தோ, சட்டங்களில் மாட்டித் தொங்க விட்டோ அல்லது வேறு வழிகளிலோ காய வைக்கவேண்டும். தகிக்கின்ற நடுப்பகல் வெயிலில் தோல்களைக் காய வைக்கக் கூடாது. நிழலில் காய வைப்பதே சிறந்ததாகும். தோல்கள் காய்ந்த பிறகு மயிர்ப்பக்கம் நன்றாக 'பிரஷ்' செய்யப்பட்டுப் பாது காக்கப்படுகின்றன. தோல்களை முதுகுத் தண்டுப் புறமாக மடிப்பது கூடாது.

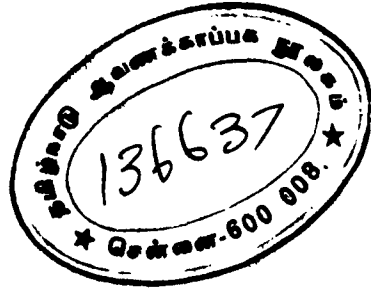
—○—

வாஷிங்டனில் நடைபெற்ற தோல் ரசாயன ஆராய்ச்சி யாளர்களின் சொசைடிகளது அகில உலக யூனியனின் 7-வது கூட்டத்தில் கலந்து கொண்டு விட்டு, இந்நிலைய டைரக்டர் டாக்டர் நாயுடம்மா அவர்கள் பாரிஸ் வழியாகச் சென்னை வந்து சேர்ந்தார்.

லெதர் எக்ஸ்போர்ட் பிரமோஷன் கவுன்சிலின் நிர்வாகக் கமிட்டியினது 'எசன்ஷியாலிடி சர்டிபிகேட் உப கமிட்டி' யின் அங்கத்தினராக இந்நிலையத்தின் உதவி டைரக்டர் டாக்டர் எஸ். கே. பரத் மறுபடி தேர்ந்தெடுக்கப் பட்டுள்ளார்.

கொழும்புத் திட்டத்தின் ஆதரவில் 'எண்ணெய் பதனிடுதல்' (Oil Tanning) என்பது குறித்து மேற் பயிற்சிக்காக இங்கிலாந்தில் உள்ள 'லீட்ஸ்' பல்கலைக் கழகத்திற்கு ஸ்ரீ. கே. எஸ். ஜெயராமன் (எஸ். எஸ். ஏ.) சென்ற மாதம் 20-ம் தேதி சென்னையிலிருந்து புறப்பட்டுச் சென்றார்.

—○—



"Registered No. M. 7050."

CLRI Publications

PROCESS BULLETIN No. 1: Adapted processes for manufacture of box and willow sides—Re. 1/- per copy. Postage extra.

PROCESS BULLETIN No. 2: Processes for the manufacture of Glazed kid. Re. 1/- per copy. Postage extra.

PROCESS BULLETIN No. 3: Manufacture of Roller skin. Re. 1/- per copy. Postage extra.

PROCESS BULLETIN No. 4: Fish Oil of the West Coast for the Indian Leather Industry. Re. 1/- per copy. Postage extra.

PROCESS BULLETIN No. 5: Rapid Tannage of Sole Leather. Re. 1/- per copy. Postage extra.

SYMPOSIUM ON EAST INDIA TANNING INDUSTRY AND TANNING AGENTS (1955): Proceedings, discussions and papers presented. Re. 1/- per copy. Postage extra.

SYMPOSIUM ON "RAW HIDES & SKINS"—Curing and Preservation (1957): Proceedings and Papers. Re. 1/- per copy. Postage extra.

SYMPOSIUM ON "LEATHER AUXILIARIES" (1958): Proceedings and Papers. Re. 1/- per copy. Postage extra.

SYMPOSIUM ON "TANNING AS A SMALL SCALE & COTTAGE SCALE INDUSTRY" (1959): Proceedings and Papers. Re. 1/- per copy. Postage extra.

SYMPOSIUM ON "UTILISATION OF BY-PRODUCTS OF LEATHER INDUSTRY" (1960): Proceedings and Papers. Re. 1/- per copy. Postage extra.

*For further information please contact
Director*

CENTRAL LEATHER RESEARCH INSTITUTE
Adyar, Madras-20, India