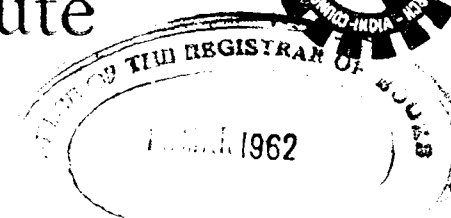


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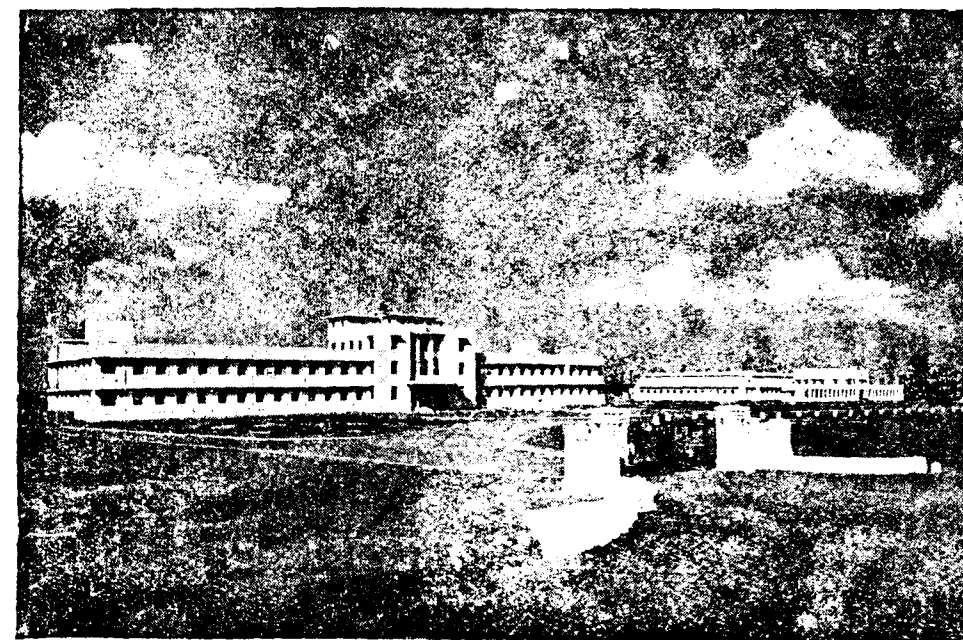


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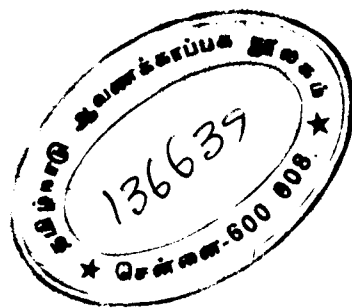
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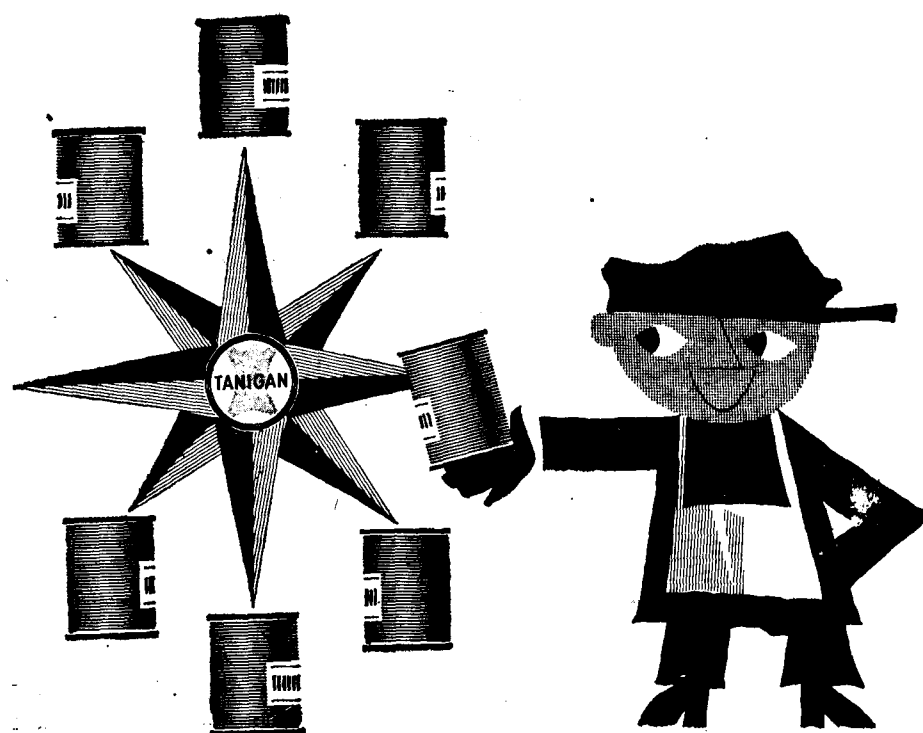
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EFFECT OF SYNTAN AND VEGETABLE TANNING MATERIALS ON THE CHARGE CHARACTERISTICS OF CHROME LIQUOR*

BY

T. J. DEVASSY & Y. NAYUDAMMA,
 Central Leather Research Institute, Madras-20.

SUMMARY

Using an electrophoretic technique reported earlier and also spectrophotometry, the effect of addition of syntans and vegetable tanning materials to chrome liquors has been studied. Data on the changes in the charge characteristics of the chrome complexes are presented. The results obtained are discussed in terms of the complexing ability of the added materials.

Introduction.

In the manufacture of certain types of leathers, chrome tanned stock is further treated with syntans and/or retanned with vegetable tanning agents. Syntans of the sulphone, sulphonamide, condensed urea or phenol or urea-sulphone type are used with advantage for bleaching chrome leather. Naphthalene sulphonic acid condensation products also are very popular. Retanning of chrome leather with vegetable tans is resorted to for obtaining additional thickness and filling up of the loose areas. In either of these retreatments, the exact effect of the agent used for retreatment on the chrome complexes present in the leather is not clearly understood. While the bleaching effect of syntans is attributed to the complexing of the syntan with the chrome, the precise mechanism of bleaching is not quite clear. Similarly, in vegetable retannage, it is not known whether the vegetable tanning material enters into the chrome complexes attached to collagen or not. With a view to throw further light on these aspects, the changes effected in the charge type and composition of chrome complexes in chrome liquors, by addition of syntans and vegetable tanning agents respectively, have been studied electrophoretically and spectrophoto-

* Based on the thesis of Shri T. J. D., approved for the award of Ph.D. degree of the University of Madras.

metrically. The studies with vegetable tanning materials have been carried out in the presence of a syntan—Basyntan FC (the latter being needed to prevent precipitation on addition to chrome liquor). To understand the mechanism of retannage better, the effect of the prechrome tanning hide powder on the subsequent uptake of different fractions of vegetable tanning material separable by electrophoresis also have been studied in a qualitative manner.

Experimental

To 100 ml. portions of 2% solution of neutral salt free 33% basic chrome liquor, 5 gm. of Basyntan FC (B.F.C.) were added separately and the cationic, anionic and nonionic chrome complexes in the resultant liquors were determined electrophoretically at different intervals after addition, i.e. 0.25, 1.0, 3.0, 24.0, 72.0, 120.0 and 240.0 hours, using the technique described in an earlier communication.¹ Identical series were run with 2 gm. of B.F.C. and 5 gm. of toluene sulphonic acid respectively. The spectrophotometric studies were carried out with B.F.C. only the absorption being read between 400 m μ and 600 m μ at intervals of 0.5, 1, 2, 4, 24 and 48 hours after addition of the syntan. Just prior to taking the readings, the solution was diluted with 1% sodium sulphate solution, the pH of which was adjusted to that of the chrome liquor (chromium gets precipitated by dilution with water). In another series, to 100 ml. portions of chrome liquor, 2, 4, 6 and 8 gm. of the syntan were added separately and after being set aside for two days, spectrophotometric readings were taken to find the effect of concentration.

Results and Discussion

Electrophoretic data: From Table I, it could be seen in all cases that addition of syntan immediately leads to decrease in the cationic chrome content with formation of nonionic chrome and of very little anionic chrome. The decrease in cationic chrome content is appreciable upto a period of three hours only, the changes thereafter being not so significant. Within one hour, the cationic chrome content is reduced to 78% with B.F.C. as compared to 88% only with toluene sulphonic acid. After ten days, the values are 70.8% with B.F.C. and 78% with toluene sulphonic acid. Increase in quantity of B.F.C. added does not produce any large change.

Spectrophotometric data: From Table II. it seen that $\frac{1}{2}$ hour after the addition of syntan, the intensity of absorption rises

TABLE I
Effect of addition of syntan on composition of chrome liquor
(Electrophoretic Data)

Time after addn.	5 gm. toluene sulphonic acid/100 ml. of chrome liquor (2% Cr.)			gm. B.F.C. per 100 ml. chrome liquor (2% Cr.)		
	Cationic Cr	Nonionic Cr	Anionic Cr	Cationic Cr	Nonionic Cr	Anionic Cr
Original	97.0	3.0	nil	97.0	3.0	nil
15 minutes	92.1	7.9	nil	81.5	16.8	1.7
1 hour	88.2	11.8	nil	81.3	17.3	1.4
3 hours	79.8	18.6	1.6	72.5	24.7	2.8
24 "	79.0	19.1	1.6	71.8	25.0	3.2
72 "	78.2	19.6	2.2	71.5	24.7	3.8
120 "	78.5	19.7	1.8	71.2	25.0	3.8
240 "	78.3	20.0	1.7	70.8	25.2	4.0

TABLE II
Effect of addition of syntan on intensity of absorption at maxima.

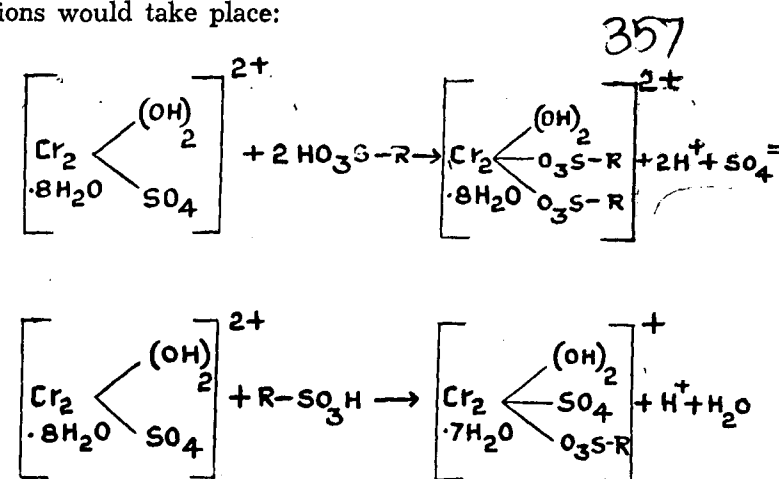
Blank chrome liquor	Time after addition (in hrs.)											
	1/2	1	2	4	24	48						
Wave length	425	425	425	425	425	425	Absorbance	Wave length	Absorbance	Wave length	Absorbance	
Absorbance	0.304	0.318	0.319	0.319	0.319	0.319						
Wave length	584	584	584	584	584	584	Absorbance	Wave length	Absorbance	Wave length	Absorbance	
Absorbance	0.256	0.269	0.269	0.269	0.269	0.269						

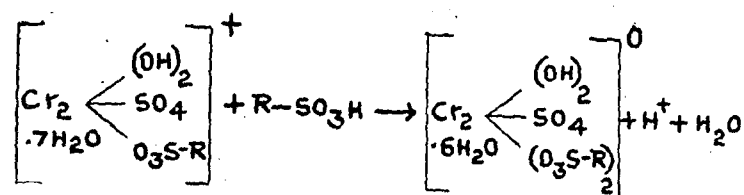
TABLE III
Effect of concentration of syntan on spectral characteristics of chrome liquor.

Blank chrome liquor	gm. B.F.C. per 100 ml. liquor											
	2		4		6		8					
W.L. Absorbance	418	0.310	418	0.315	420	0.328	422	0.328	W.L. Absorbance	422	0.328	
W.L. Absorbance	588	0.269	580	0.274	572	0.284	572	0.293	W.L. Absorbance	572	0.293	

from 0.304 to 0.318 at peak I and from 0.256 to 0.269 at the peak II, the changes in absorption being concomitant with a bathochromic shift of 3 mμ at peak I and a hypsochromic shift of 4 mμ at peak II. The further changes in absorption with time, are not so pronounced being 0.322 and 0.271 at the peaks I and II respectively after 48 hours. On increasing the amount of syntan added, the bathochromic effect noticed earlier at peak I is not in evidence; the hypsochromic effect at the peak II is considerably increased being 16μ with 8 gm. of the syntan. The intensities of absorption at the two peaks are found to increase with increasing concentration of syntan, the values for peaks I and II being 0.310 and 0.269 respectively with 2 gm. and 0.328 and 0.293 respectively with 8 gm.

From the greater reduction in cationic chrome content with B.F.C., it would appear that B.F.C. has a greater penetrating capacity than toluene sulphonic acid, possibly due to the difference in chemical constitution. The capacity of the syntan to enter into chrome complex seems to be very much limited as there is no marked difference between the reduction in cationic chrome with 2 gm. and that with 5 gm. of syntan. In spectrophotometric studies, the complexing ability is indicated by the change in maxima wavelength and in the intensity of absorption. The limited complexing ability of the syntan is brought out by the spectrophotometric data also. The penetration of the syntan into the chrome complex could be by displacement of either the SO₄ group or H₂O within the complex by —SO₃H. In the former case, there would be no change in the charge of the complex whereas in the latter case, there would be. Depicting syntan as R-SO₃H or R-SO₃ Na, the following types of reactions would take place:

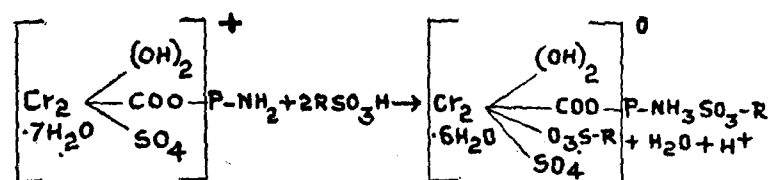




The limited extent of penetration by the syntan indicated by the electrophoretic data would appear to show that the displacement of H_2O by the syntan occurs to a limited extent only. It would be that both the alternatives pictured above are valid.

The spectral behaviour gives good support to the conclusions drawn from electrophoretic data, regarding complexing ability and also shows that the main changes are in the initial stages itself. Again with increase in amount of syntan added, there is no corresponding increase in intensity of absorption, thus showing the limited capacity of syntan to complex with chrome. The acidic nature of added anion may be responsible for the increased hypsochromic effect at the second peak without affecting the first peak.²

The interaction of syntan with chrome complexes fixed on collagen could be as follows:



The lighter colour of leather bleached with syntan would be due to different absorption behaviour of the resulting complexes. Also the R portion of the syntan, $\text{R-SO}_3\text{H}$, sticking out in protein may give rise to a different absorption wavelength.

Addition of vegetable tanning material to chrome liquor in the presence of Basyntan FC:

Experimental

To 100 ml. portions of a 2% chrome liquor each containing 2 gm. of B.F.C., solutions of myrobalan and wattle extracts containing 5 gm. of tannin were added; the different complexes, viz., cationic, non-ionic and anionic were determined at different intervals after

addition, viz., 0.25, 1, 3, 24, 72, 120 and 240 hours. B.F.C. was added to the chrome liquor to avoid precipitation of chromium on addition of tanning material. As in the previous experiment, absorption values in the visible range were taken to find the effect of myrobalan and wattle extracts as well as of the ethyl acetate fraction of myrobalan tannin on spectral characteristics of chrome liquor in presence of B.F.C. The ethyl acetate fraction was taken up in order to observe the effect of purification of tannin on its reaction with chrome liquor. In the spectrophotometric studies, only 1 gm. of the tannin as against 5 gm. in electrophoretic studies, was used; otherwise the absorption due to vegetable tannin would be very high when compared to that due to chrome liquor and this would make differential readings unreliable.

Results and Discussion

Table IV gives the electrophoretic data. In both myrobalan and wattle, the cationic portion goes on decreasing with time with formation of nonionic complexes, the anionic being formed in very low quantities. The percentage of cationic chrome in the presence of wattle is 58 after 10 days whereas it is 61 in the presence of myrobalan and 72 when syntan alone is present. The equilibrium is attained in myrobalan earlier than in wattle. In the case of the vegetable tanning materials, in addition to penetration by the anions of the nontanning acids, replacement of groups inside the complex by reactive groups like COO present in myrobalan tannins also is to be thought of. The presence of COOH groups in pyrogallol tannins is known.³ So the higher complexing power of pyrogallol tannins would be due to the nontans present and also to the comparatively more powerful acidic groups in these tannins. It is also possible that these acidic groups displace the sulphato radicle, there being no resultant change in the charge of the chrome complex.

Spectrophotometrically (Table V) by the addition of myrobalan, the intensity of absorption at peak I increases from 0.286 to 0.499 in $\frac{1}{2}$ hour and this increases further with time; at peak II, there is no change other than that due to B.F.C. Changes happen initially itself. The hypsochromic effect is of the order of 10 m μ at peak I and 10 m μ at peak II after 4 hours. When the ethyl acetate fraction is used, the hypsochromic effect at the both peaks is much less than when water extract of myrobalan is used. Also, it tends to show bathochromic effect at peak II. By the addition of wattle, intensity of absorption increases at both peaks only after a little lag in the initial stages, the readings being 0.429 at peak I and 0.314

TABLE IV
Effect of addition of vegetable tanning materials on composition of chrome liquor.
(Electrophoretic data)

Time after addn.	Cationic Cr	Wattle Nonionic Cr	Anionic • Cr	Cationic Cr	Addition of myrab Nonionic Cr	Anionic Cr
15 minutes	97.0	3.0	nil	97.0	3.0	nil
1 hour	88.8	10.6	0.6	89.3	10.7	nil
3 hours	81.2	17.8	1.0	80.0	18.8	1.2
24 hours	73.0	22.7	1.2	73.8	24.3	1.9
72 "	73.0	25.8	1.2	71.7	26.5	1.8
120 "	62.6	36.3	1.1	64.5	33.7	1.8
240 "	59.5	39.2	1.3	62.7	35.5	1.8
	57.9	40.9	1.2	61.2	36.7	1.9

TABLE V
Effect of addition of myrobalan and wattle extracts on spectral characteristics of chrome liquor

	Blank chrome liquor		Time after addition			
	W.L. Absorbance		½ hour W.L. Absorbance	1 hour W.L. Absorbance	2 hours W.L. Absorbance	4 hours W.L. Absorbance
Myrobalan	422	0.286	416	0.499	412	0.579
			416	0.554	412	0.581
	586	0.240	576	0.265	576	0.272
			576	0.271	576	0.272
Wattle	422	0.286	422	0.332	422	0.384
			422	0.339	422	0.429
	586	0.240	592	0.271	592	0.291
			592	0.276	592	0.314

at peak II after 4 hours. There is no shift in peak I, whereas a bathochromic effect of 6 m μ is observed at peak II at all intervals. But when B.F.C. alone is added, there is no bathochromic effect. Hence it shows that by the addition of wattle there is definite bathochromic effect at peak II. Most of the organic salts studied⁴ do not show a bathochromic effect at peak II and also no orthodihydroxy group may be present in wattle tannin, unlike with myrobalan. Though nothing definite could be said about the nature of groups present, it is evident that the reactive groups responsible for complexing in wattle are different from those in myrab. It may be that wattle may be displacing only H₂O where as myrobalan may be displacing H₂O and SO₄.

Effect of pretanning with chrome and vegetable tannin on subsequent vegetable and chrome tanning respectively :

Experimental

To 2 gm. of hide powder, 40 ml. of water and 3.5 ml. of 10% Cr₂O₃ solution 33% basic neutral salt free chrome liquor were added and shaken for 2 hours and then analysed electrophoretically before and after tanning; the amount of total chrome, cationic and noncationic chrome taken by hide powder was thus determined. In another case, to 2 gm. hide powder as in above case 1 ml. of 15% tannin solution of myrobalan and wattle extracts were added separately, shaken for 10 minutes, washed thrice with distilled water and chrome tanned as above and the different complexes taken up were determined by electrophoresis. Results are given in Table VI.

TABLE VI

Chrome complexes taken up by 2 gm. dry hide powder

	Cr uptake in gm.			
	Total	Cationic	Nonionic	Anionic
Original	0.2600	0.2500	0.0100	nil
Chrome tanning	0.1960	0.0146	0.0050	nil
Chrome tanning after myrab tanning	0.1810	0.1340	0.0047	nil
Chrome tanning after wattle tanning	0.1710	0.1220	0.0049	nil

Results and Discussion

By myrobalan and wattle pretanning, the uptake of total chrome and cationic chrome is reduced whereas the uptake of non-ionic portion is not affected; this would show that the fixation of non-ionic Cr. occurs at a site not affected by vegetable tannin. The higher uptake of chrome in presence of myrobalan as compared to wattle may be because of the myrobalan too acting as an additional site for fixation of chrome.

By paper electrophoresis, it is seen that in myrobalan and wattle, there are a number of fractions and also that in both there is a fraction which does not migrate during electrophoresis. By electrophoresis of the spent liquor after tanning with hide powder, it is seen that in both cases all the fractions reappear. But the only difference is that the fraction which does not migrate during electrophoresis is reduced considerably in magnitude. When tanning is done with chromed hide powder, it is seen that more of the fraction not migrating during electrophoresis is taken up by hide powder. This fraction considered to be high molecular size tannin does not move in the limited period of electrophoresis perhaps due to large particle size. It is likely, chromed collagen may have a positive charge, in which case, the vegetable tannin fraction which moves fastest during electrophoresis, may be taken up by hide powder preferentially, since the fastest fraction may be most electronegative. But the data indicate the opposite. This may be so because of these fractions getting attached to reactive groups of collagen directly in preference to chrome complexes, though it is possible for vegetable tannin to complex with chrome when not attached to collagen.

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STUDIES ON THE BACTERIAL FLORA OF WET SALTED HIDES

I A New Approach to Bacterial Counts

BY

N. U. RAO* AND R. BHASKARAN

Central Leather Research Institute, Madras-20

Received on May 8, 1961

It is known that prevention or at least the reduction of the bacterial decomposition of the valuable hide proteins is attempted in curing of hides and skins. It is very important to see that collagen is not destroyed by bacteria prior to tanning because such a destruction will result in inferior leather irrespective of the tanners' skill and experience. Both proteolytic and nonproteolytic types of bacteria occur on raw hides, the former being responsible for the decomposition of collagen.

It is simple to visualise that saprophytic bacteria from soil, water and air may be found as transient flora of the hides. These are the casual contaminants that are present on the hides and skins and they can be removed easily by washing or soaking for a short time. In addition, there will be resident bacterial flora which will be within the skin folds and in the hair follicles and which are apparently very important in the putrefaction of the hides and skins. Organisms of this group are permanently associated with hides and skins and can not be entirely removed easily. It is conceivable that the resident bacterial flora play a decisively more important role in the deterioration of the hides and skins than the transient flora.

Hides and skins with large numbers of bacteria may also contain more objectionable bacteria than those with few bacteria. However, it is not known whether there is any relationship between the numbers of bacteria of the cured hides and skins and the quality

* Present Address: Central Public Health Engineering Research Institute, Nagpur.

of leathers produced from them. Hence a quantitative estimation of the bacteria of the cured hides and the assessment of the leathers obtained from them are important before one can draw any conclusions regarding the possible relationship between the two. Moreover, the total bacterial count of hides and skins may be important since it may be a reliable measure of the care with which these raw materials were obtained, handled and cured.

In 1931, Rockwell¹ counted the bacteria in soak waters from the vats by the dilution plate method. Stuart and Frey² while studying the effect of moisture on the microbial decomposition of salted skins, estimated the numbers of bacteria by the direct microscopic counts using Breed's method. Stuart and Frey³ used different chemicals with salt in curing hides and skins. After appropriate incubation, the samples were soaked in six times their weight of distilled water for 4 hours at 23°-28°C. Here also the counts were made by the Breed film method. Anderson⁴ classified the normal bacterial flora of the fresh hides and skins after washing the samples with sterile distilled water and plating these washings with nutrient agar, after making the necessary dilutions. George⁵ suspended the hide pieces in ten times their weight of sterile distilled water and shook the specimens for 4 hours on the machine before making the plate counts. None of the procedures adopted by these investigators took into account the existence of the resident bacterial flora of the hides and skins. Therefore, the counts obtained by them could not give the real picture of the bacterial flora of these raw materials for the leather industry. The present investigation is undertaken as an attempt to obtain all the aerobic bacteria present in the cured hides by using the dilution plate method.

Experimental

A piece from a wet salted slaughtered cow hide was taken and cut into approximately 1" square pieces. 10.0 gm. of these were placed in each of two sterile conical flasks of 250 ml. capacity. 100.0 ml. of sterile distilled water was added to each of these two flasks aseptically and they were labelled as No. 1 and No. 2.

Flask No. 1: It was shaken for 1 hour at room temperature on the shaking machine (A.H.T. Co.). After taking 1.0 ml. sample from this flask for serial dilutions, it was kept immediately in the refrigerator. Using 9.0 ml. sterile distilled water blanks, serial dilutions were made upto 1:100,000. From each of these dilutions, 1.0 ml. samples were taken with sterile 1.0 ml. pipette and duplicate plates were made. Nutrient agar, melted and cooled

to 45°C was poured into these plates and mixed thoroughly. After solidification, the plates were inverted and incubated aerobically for 48 hours at 37°C, before the colony count was made with a Quebec colony counter. The average number of colonies multiplied by the dilution factor gave the number of bacteria per ml. of the original suspension. Ten times this number would give the number of bacteria per gram of hide.

After 24 and/or 48 hours in the refrigerator, the flask was taken out and shaken by hand by giving it a few swirls, before 1.0 ml. sample was taken for serial dilutions and counts. This process was repeated after keeping the flask for 72 hours in the refrigerator.

Flask No. 2: In order to maintain this at the same incubation temperature as the first flask, it was kept at room temperature for one hour and then placed in the refrigerator for a period of 24 and/or 48 hours. It was taken out and shaken for one hour on the machine before 1.0 ml. sample was taken for serial dilution upto 1:10,000,000 and plating. This process was repeated after keeping the flask for a total period of 72 hours in the refrigerator. The results were recorded in Tables 1 and 2.

TABLE 1

Hide	Initial count	Number of bacteria per gram of hide			
		After 24 hrs. soaking		After 72 hrs. soaking	
		Flask 1	Flask 2	Flask 1	Flask 2
A	1.6×10^5	1.6×10^5	2.6×10^5	5.4×10^6	3.0×10^9
B	1.4×10^4	8.3×10^4	3.5×10^7	1.0×10^6	5.2×10^{10}

TABLE 2

Hide	Initial count	Number of bacteria per gram of hide			
		After 48 hrs. soaking		After 72 hrs. soaking	
		Flask 1	Flask 2	Flask 1	Flask 2
C	3.5×10^5	3.0×10^6	9.6×10^6	4.4×10^6	4.1×10^8
D	1.2×10^5	1.5×10^6	6.5×10^8	6.2×10^6	3.7×10^9

Another sample of cured cow hide from Darbhanga in Bihar State gave an initial count of 2.7×10^4 and a final count of 7.7×10^8 after soaking it for 72 hours in the refrigerator and shaking it for one hour on the machine. A qualitative analysis of the bacterial flora of this hide was carried out by streaking nutrient agar plates to see whether the increase in the count was due to the multiplication of bacteria that were in the original count or due to the release of different organisms from the hide after 72 hours soaking and shaking.

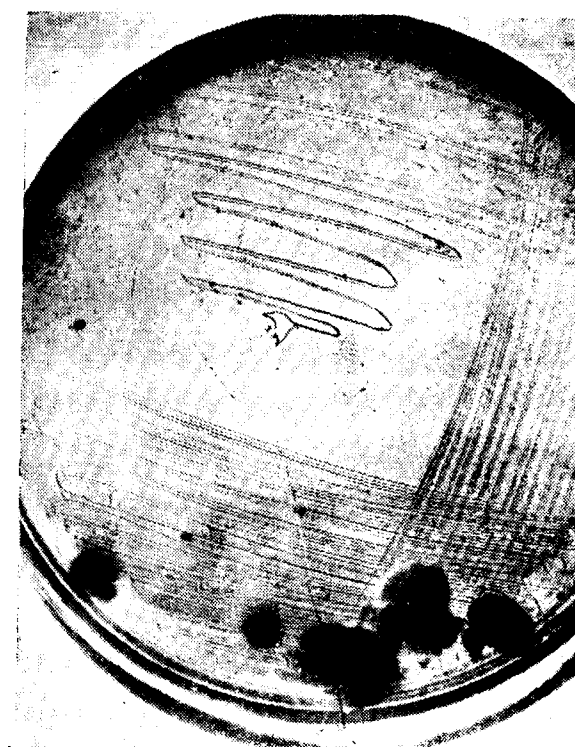


FIGURE I: Showing only two types of colonies; represents the qualitative streaking on a nutrient agar plate with a biconvex loopful (4 mm. diameter) of the initial suspension.

All the colonies from both the nutrient agar plates, qualitatively streaked with a loopful from both the initial and final suspensions, were picked up for subcultures. After a complete study of their staining, morphological and physiological characteristics they were identified. Only two species, *Bacillus subtilis* and *Bacillus firmus* were found in the initial suspension and both of them were gelatinase positive. However, the final suspension

yielded eight species of bacteria in addition to the above two. They are (1) *Micrococcus roseus*, (2) *Bacillus cereus*, (3) *Staphylococcus aureus*, (4) *Sarcina lutea*, (5) *Bacterium zophi*, (6) *Achromobacter stearophium*, (7) *Flavobacterium sulfureum* and

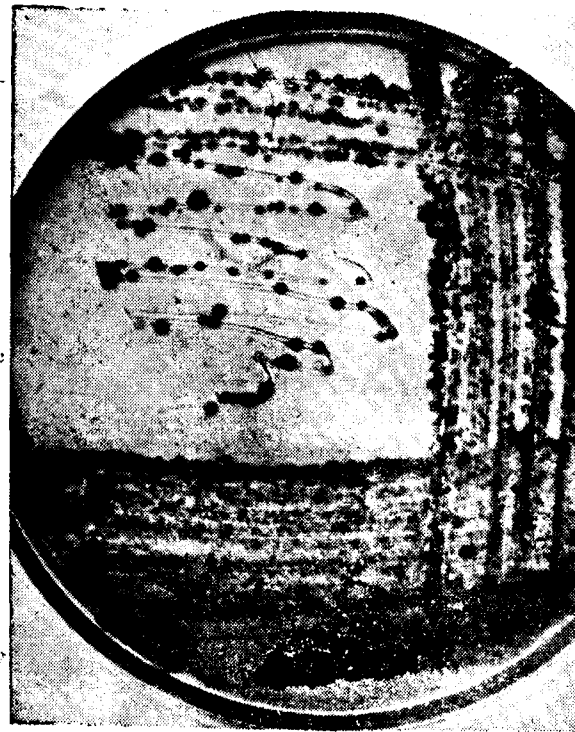


FIGURE II: Showing numerous types of colonies; represents the qualitative streaking from the same suspension after the hide was soaked for 72 hours in the refrigerator and shaken for one hour on the machine.

(8) *Corynebacterium bovis*. Out of these eight organisms, the first four were gelatinase positive.

Discussion and Conclusions

Bacterial counts of cured (wet salted) hide samples from Bihar State were made immediately after suspending them in ten times their weight of sterile distilled water and after keeping these suspended samples in the refrigerator for different periods of time. These counts were made by the dilution plate method using nutrient agar as the medium. Breed film method adopted by Stuart^{2,3} for making counts was not used here because the dead

cells cannot be differentiated from the living ones in this microscopic procedure. Moreover, this method may result in considerable errors in counts since a large factor is used for converting the number of bacteria per field to the number per ml. This error is particularly prominent when the samples have low bacterial counts.

The results recorded in tables 1 and 2 clearly show that significantly larger numbers of bacteria were found after the hide samples were soaked for 72 hours in the refrigerator. Comparing the figures in the last two columns of these tables, it can be seen that even after soaking, the maximum number of bacteria could be obtained only by shaking the specimens on the machine for one hour.

It was found that all the bacteria in the hide samples were not accounted for, if the samples were shaken for 1 hour soon after the addition of water and plated. Increasing this period of shaking on the machine to 4 hours as was done by George, did not yield any higher counts.

After 48-72 hours soaking in water at refrigerator temperature, a 1,000 to 10,000 fold increase in numbers of bacteria was noticed. This was considered to be due to the actual release of the resident bacterial flora of the hides into the soak waters. One could say that this increase might be either due to a technical error or due to the actual multiplication of organisms in the refrigerator. However, this could not have occurred since a much larger number of different species of organisms were observed from the suspension after 72 hours refrigeration than from the initial suspension as illustrated in figures I and II. If there was considerable multiplication in the refrigerator, larger numbers of the same species found in the initial suspension would be present in the final suspension. But the results clearly indicated that the increase in numbers was due to the numerous additional species found in the final suspension.

In view of the data obtained, it is suggested that the hide samples should be soaked in ten times their weight of water at refrigerator temperature for 72 hours and then shaken for 1 hour on the machine before plating to get their complete bacterial picture.

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RESEARCH BEARS FRUIT

Manufacture of charas leather with a 2:1 blend of sonali bark and myrobalans using straight liming*

BY

S. P. GHOSH

Raw material:

Air dried cow hides of the weight range 2.7-3.6 kg. (6-8 lb.) are used.

N.B.: Quantities of chemicals given below are per 40 kg. (one maund) of dry hide.

Soaking:

1st day: The hides are soaked overnight in a bath containing:

Soda ash	..	0.37 kg. (13 oz.)
Lime	..	0.45 kg. (1 lb.)
Water	..	400 l (88 gal.).

2nd day: Next morning, the hides are raw fleshed and put back in the same bath till the evening with occasional trampling to make them softer. When sufficiently soft, the hides are washed, drained and weighed (soaked weight).

Liming:

The weighed hides are then put in sufficient quantity of old lime liquor strengthened with 4.54 kg. (10 lb.) of fresh lime. The old lime liquor used is one through which two lots have passed; but it should not have been in storage for more than ten days.

3rd day: The hides are handled once in the morning and once in the evening.

4th-7th days: Handling is done as on the 3rd day.

* Process demonstrated in Barpali, Orissa, in May, 1961.

Reliming:

8th day: The hides are unhaired and put in fresh lime bath containing the following:

Lime	6.80-9.07 kg. (15-20 lb.)
Water	320 l. (70.4 gal.)

The hides are handled for 15 minutes in the evening and left in the pit overnight.

9th day: The goods are handled in the lime liquor for 15 minutes once in the morning and once in the evening.

10th day: The pelts are fleshed, washed, scudded and weighed (fleshed weight).

Deliming:

Deliming is carried out with:

Ammonium sulphate	0.45 kg. (1 lb.)
Water	120 l. (26.4 gal.)

The scudded goods are handled in the deliming bath for ½ hour and left in the pit overnight.

Preparation of malni liquor:

The colouring liquor for using on the next day is prepared as follows:

The tanstuff used is a blend of 2 parts of sonali bark and 1 part of myrobalan, a total weight of 90 kg. (198.0 lb.) i.e. almost equal to the fleshed weight being required. One-fourth of this is leached with water, the remaining three-fourths being intended for putting into the bags when they are made.

11th day: In the morning, the hides are handled in the deliming bath for ½ hour. Progress of deliming is ascertained by applying a few drops of phenolphthalein solution, if available, or 'Haldi' powder (turmeric), to a cut section of the thickest portion of hide. Complete deliming should be achieved. The delimed pelts are scudded, washed once and transferred to the colouring liquor prepared as mentioned earlier.

Colouring:

The delimed pelts are handled in the colouring pit for 2 hours and left overnight covering them with bark.

Complete analysis of the leather

1. *Physical test:*

	Grain crack & bursting lb/inches.	Tens. strength lb/sq. inch	Elongation at break load	Elongation 750 lb/sq. inch		Double stitchtear lb/inch.
				Temp.	Perm.	
Parallel to backbone	17,600 lb.	3580 lb.	35	10%	2.5%	1036 lb.
Perpendicular to backbone	—	5900 lb.	24	6.25%	2.5%	963 lb.

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12th day: They are handled in the colouring pit for 1½ hours and left in it.

13th day: Handling is done as on the 12th day.

Bag tanning:

14th day: The pelts are stitched into bags and hung up after stuffing them with the remaining three-fourths of the sonali and myrab blend and pouring fresh water to fill up. The bags are replenished with the liquor in the pit from time to time.

15th day: Bag tanning is continued.

16th day: The bags are reversed and tanning is continued.

17th day: Bag tanning is continued.

18th day: In the evening, the bags are opened and left overnight in the liquor in the pit.

Oiling:

19th day: The leathers are scoured, washed well and piled up for a few hours, oiled with 1.81 kg. (4 lb.) of groundnut oil. In the evening, the hides are hung up for drying.

Yield of the leather—43.7% on fleshed weight.

2. *Microscopical test:*

Fibre bundles are full and fairly compactly woven with comparatively lower angle of weave. For an upper leather, the structure is fairly good and will give fairly high tensile strength; the only drawback is that the grain layer is thin and weak and not compact.

3. *Chemical analysis:*

Moisture	14.0	Hide substance	38.29
Oils and fat	3.31	Fixed tannin	33.77
Water solubles	10.46	Degree of tannage	88.18
Insolubles	0.17	pH of water solubles	4.1
Leather substance	72.06		

Analytical report of the sample of sonali bark used.

Moisture	10.4%	Insolubles	59.4%
Tans	14.1%	Colour (0.5% T)	Y 9.9
			R 3.7
Nontans	16.1%	pH	4.1

N.B.: These leathers are suitable as uppers also for country-made shoes.

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LETTER TO THE EDITOR

Isolation of polyphenolic components from the different parts of myrobalan (*Terminalia chebula*) and divi-divi (*Caesalpinia coriaria*)

Myrobalan and divi-divi belong to the hydrolysable type of tannins. Extensive work¹ has been carried out on the chemistry of tannins of myrobalan nuts and divi-divi pods. However, similar information is not available about the components present in the other parts of myrobalan and divi-divi plants (e.g. leaves, bark, sap wood, heartwood etc.) Hence present studies have been directed at the detection and isolation of the tannin constituents in the various parts of these two plants. Such a study is a *sine quo non* for having a complete picture of biosynthesis of tannins in these plants.

It has been found that the leaves of both myrobalan and divi-divi contain about 10% tannin, thus indicating that they could be profitably collected and used in the leather industry. Actually, the hides tanned with extracts of the leaves have been found to be good; they were comparable in colour, feel, texture, flexibility and fullness to the leathers made from the extracts of myrobalan nuts and divi-divi pods.

Identification of the phenolic constituents in the extracts from the different plant parts has been by two dimensional chromatography using two different solvent systems:

(i) 6% acetic acid containing 0.2% formic acid for the first way followed by benzyl alcohol-*tert*-butanol-isopropanol-water (3:1:1:1 v/v) mixture containing 1.8% formic acid for the second way² (ii) *tert*-amyl alcohol-water-acetic acid (69:940:1 v/v) for the first dimension and *sec*-butyl alcohol saturated with water for the second.³

Ferric chloride-potassium ferricyanide reagent was used for developing the spots. The chromatograms corresponding to the extracts from leaves and fruits (or pods) of myrobalan and divi-divi were found to be alike, indicating the presence of common constituents. However, from the actual quantities of the components

isolated as well as from the intensity of the spots in the chromatograms, it was found that the concentration of any particular component was less in the leaves than in the fruits or pods.

It has been possible to isolate and characterise from the leaves of divi-divi and myrobalan, chebulinic acid, chebulagic acid and corilagin accompanied by varying proportions of the following products of partial and complete hydrolysis: Chebulic acid, 3:6-digalloyl glucose, ellagic acid and gallic acid. The infra-red spectra and optical rotation of chebulinic acid, chebulagic acid and corilagin isolated from the leaves were identical in all respects with those of the samples of these compounds isolated from myrobalan nuts.

As regards the chromatograms with extracts from other parts of the two plants, well defined chromatograms could not be obtained. Components like chebulinic acid and chebulagic acid were absent in these. However, the presence of ellagic acid and gallic acid could be deduced from the chromatograms. On changing the solvent system to that recommended for condensed tannins, i.e. 6% acetic acid for the first way and *sec*-butyl alcohol-acetic acid-water (14:1:5 v/v) in the second way⁴, a spot corresponding to *D*-catechin was noticed in the chromatograms of heartwood, sap wood and bark through development of red colouration with vanilin-HCl reagent; however, the intensity of the spot was low indicating presence of traces of this compound. No compound related to condensed tannins (e.g.) *D*-catechin was obtained in the case of leaves and pods.

Isolation of the various components was carried out as indicated below¹:

Both myrobalan and divi-divi leaves on extraction with acetone gave an orange coloured extract. The extract was taken up in minimum water and adjusted to pH 6.3, by adding solid sodium bicarbonate and extracted with ethyl acetate. The ethyl acetate solution on evaporation gave the phenolic fraction. The aqueous solution was then brought to pH 2.2 by the addition of 50% orthophosphoric acid and extracted with ethyl acetate. On evaporating the ethyl acetate solution *in vacuo*, the carboxylic acid fraction was obtained as an orange coloured solid. Both phenolic and carboxylic acid fractions on hydrolysis with $N H_2SO_4$ gave gallic acid, ellagic acid and glucose which were characterised by preparing their derivatives. By counter current experiments, corilagin was obtained from the phenolic fraction. The carboxylic acid fraction on hydrolysis with water gave ellagic acid, gallic acid, 3:6-digalloyl

glucose and chebulic acid. By fractional crystallisation, both chebulinic and chebulagic acids were obtained from carboxylic acid fraction using water as solvent. The separation was also effected through cellulose column with water as current.

October 28, 1961
C. L. R. I., Madras-

J. B. RAO
S. RAJADURAI
K. N. S. SASTRY
Y. NAYUDAMMA

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TECHNICAL SEMINARS

The leather and auxiliaries industries in some East European countries*

BY

V. R. KISHORE

Shri V. R. Kishore, C.L.R.I. visited Hungary, Czechoslovakia and U.S.S.R. under a Fellowship of the United Nations Expanded Technical Assistance Programme, for making a study of the leather industry and of the industries manufacturing leather auxiliaries in these countries.

The places visited were: The Research Institute for leather, shoes and fur, the Vegetable Oils Research Institute, the Organic Chemical Institute, the Biological Research Institute and leather and chemical factories in Hungary; vegetable oil factory, leather factory, factory manufacturing leather auxiliaries and the plant for treatment of tannery effluents in Czechoslovakia; the factory for production of synthetic fatty acids and fatty alcohols and the attached research institute at Shebekino and the Leather Factory and the Central Institute for Leather Research at Moscow, in U.S.S.R. The significant features noticed are mentioned below:

The pattern of organisational set up is such that there is a good amount of coordination between the leather factory, the factory for manufacture of leather auxiliaries and the leather research institutes. In Hungary, the three tanneries visited follow the same process.

Leather industry has been greatly mechanised and automated. Labour saving devices like automatic sprayers for lime-sulphide mixture and finishes, cranes for transferring goods from pit to pit and from yard to yard, screw type drum with separate equipment for soaking and liming, vegetable tanning and chrome tanning are in use. In the factories for auxiliaries, the construction is such that there is gravity flow of the materials from stage to stage.

* Summary of the talk given on September 8, 1961.

The fatliquors in use are based (1) on sulphated fish, sunflower, whale or sperm oil, (2) on the products obtained after splitting the sperm oil and condensing the fatty acids with triethanolamine, (3) on sulphated synthetic fatty acids and (4) on ethylene glycol esters. Auxiliaries like condensates of fatty acid chlorides and amino acids, sulphated lauryl alcohol and coconut fatty acids (chlorosulphonic acid being the sulphating agent), sulphation products of condensates of ethylene oxide with higher alcohols, cationics based on fatty acid ester and alcohol amines, wetting agents like butyl naphthalene sulphate and chrome stearato chloride are manufactured in Czechoslovakia.

In vegetable tanning 30-40% of the total tannin is replaced by syntans since the latter are cheaper. The syntans are based on phenol, sulphited cellulose extract and aromatic sulphonates.

Research is being carried out on the production of fatty alcohols and fatty acids by oxidation of paraffins with suitable catalysts. The oxidation products are analysed by gas-liquid chromatography and ultra-violet spectrophotometry.

Studies on myrobalans*

BY

P. S. SANTHANAM

Fractionation Studies

Myrobalan extract is a complex mixture of several phenolic constituents. Resolution of such a complex mixture, on a preparative scale, without initiating possible degradation is a difficult problem. Therefore the available fractionation techniques were tried for first separating the components into broad fractions containing smaller number of constituents and then further fractionating them using finer techniques. Myrab liquor of 60°Bk or above is found to separate into two layers when kept at low temperature. This has been used for effecting a preliminary separation. Solvent extraction, liquid-liquid extraction, counter current distribution, fractional precipitation with PbAc_2 or NaCl and continuous electrophoresis have been tried for broad fractionation. Electrophoresis has been found to be quite promising.

* Summary of the talks given on 6-10-1961 and 3-11-1961.

Degradation studies

For assessing the relative stability of the different phenolic constituents, four different treatments were tried. (a) Heating in sealed tube at 105°C for various periods, (b) refluxing the liquor for a definite time, (c) keeping the liquor exposed to atmosphere for different periods and (d) alkaline and acid hydrolyses. Paper chromatography and electrophoresis were used in these studies.

The first treatment showed a gradual degradation of tannins and a progressive decrease of water solubles with increase in duration. The final products obtained after heating for 60 days were ellagic acid, gallic acid and pyrogallol. Refluxing brought about an appreciable increase in the phenolic nontans. Exposure studies with tanliquors and detannised liquor would appear to indicate pronounced changes in the first few weeks with considerable loss of tans and increase in the nontans content.

Chebulinic acid and gallic acid were found in the acid hydrolysate and ellagic acid, chebulinic acid and gallic acid in the alkaline hydrolysate. So gallic acid, chebulinic acid and ellagic acid might be taken to be the stabler polyphenolic constituents of myrobalan.

Tanning studies

Tanning studies were carried out in aqueous medium with solvent extracts of myrobalan, lead acetate purified myrab liquor (liquor obtained by liberating tannins from lead tannate using sulphuric acid), eletrodialysed liquor, myrob liquor aged for different periods, aqueous myrab infusion and purified myrab liquor to which predetermined amounts of known nontans were added. It was found that the colour of the leathers obtained with solvent extracts as well as with lead acetate purified and eletrodialysed liquors of myrob was good. The tanned pieces were found to darken with ageing. The colour was also found to darken with increase in the period of tanning. These two sets of experiments showed that the nontans in myrob, reinforced by the products of degradation, determined to a large extent the shade of the leather produced. Experiments with lead acetate purified liquors to which predetermined amount of known phenolic nontans was added showed that as little as 0.2% of pyrogallol, a degradation product was enough to give the darkest colour, when compared with pieces tanned in liquors containing other nontans.

Some problems of the finished leather trade

BY

K. V. VAIDYALINGAM

(M/s Skins & Leathers Private Ltd., Coimbatore)

[Shri Vaidyalingam is the first Guest Worker to come to the Institute under the newly inaugurated Guest Workers' Scheme (vide Bull. C.L.R.I. 8, 206 (1961)). In his seminar talk on Oct. 27, 1961, Shri Vaidyalingam began by saying that he considered it a great pleasure and privilege to work in the Institute and was confident that the stay would be of immense benefit to him and to his firm; he thanked Dr. Y. Nayudamma, Director, C.L.R.I. for the opportunity given. The gist of his talk is given below].

In choosing the subject, the word 'trade' has been deliberately used instead of 'industry' or 'technology,' because the difficulties faced in the finished leather industry are due not so much to lack of know-how, as to lack of appreciation of the practical difficulties in the various aspects of the business. Some of these difficulties are outlined and a few suggestions for removal of these are submitted.

'Finished leather' is to be defined as leather tanned and finished for a specific use in the manufacture of leather goods both for consumers and the various industries, i.e., a leather ready for fabrication of articles without any further chemical processing. 'Finished leather' is taken to include E.I. tanned leathers. The latter, though no doubt, the most predominant part of Indian leather industry, are certainly not finished leathers. Failure to recognise this basic difference between E.I. tanning and finished leather manufacture in all governmental regulations, is the basic cause of most of the difficulties of the finished leather manufacturer. For example, in the I.T.C. Red Book, exporters of finished leather have import entitlements for items principally used in E.I. trade at present, there being no mention at all of the various chemicals required by finished leather trade.

The finished leather trade should have a separate and independent status distinct from E.I. tanned leather trade to avoid all confusion in the formulation of Government policies. It is submitted that

a separate Council for finished leather development may be formed by the Government along the lines of the Leather Export Promotion Council, with C.L.R.I.'s leadership and admitting only finished leather manufacturers to its membership. Such a Council could be entrusted with the issue of essentiality certificates for the import of chemicals and machinery required by the finished leather trade and could thus play an effective part in its development. The most serious problem faced is the difficulty in importing sufficient quantity of syntans, synthetic resin emulsions and other auxiliaries for dyeing and finishing, spares for machinery etc.

One source of "needless nerve racking and frustrating harassment" faced daily is the different taxing authorities of Central and State Governments, with their elaborate procedures making serious inroads into one's time. The correct interpretations of the various enactments also are not known, as e.g. in the case of certain provisions in the Central Excise Duty on footwear. The net result is the fear to expand manufacture to meet the growing demand for the products.

The Government is reported to be considering inclusion in import entitlements of exporters of finished leathers more items like dyes, finishes, auxiliaries, syntans etc. under their export promotion scheme. This is a step in the right direction. But this scheme has two serious flaws: (1) Exporters have to compete in a world market with highly developed countries like U.K., W. Germany, Japan, etc. both in quality and prices. It is well known that Indian raw prices are very high and the finished leather prices have no relation to the raw price. Export involves an importer in some other country who will buy the leathers only when and only if his requirements both in quality and price are satisfied. While quality can be taken care of by united efforts, prices are beyond one's control. So if export of finished leathers is more advantageous than the export of E.I. and raw hides and skins to the economic growth of the country, suitable steps are necessary to encourage the exports of finished leathers. Perhaps one way of doing it would be to subsidise exports of finished leathers to the required extent to meet international price levels wherever necessary, a device successfully adopted by West Germany and Japan. (2) Claims of pioneers in the manufacture of finished leathers which were formerly being imported into the country are being completely ignored because they are not exporting. These manufacturers cut down imports and help the country save considerable foreign exchange which is just as important and good if not more than those who earn foreign exchange by exports.

C.L.R.I. should give the highest priority and take intensive steps to develop the manufacture of auxiliaries like nonionic and cationic wetting agents, syntans, resin emulsions, aqueous final finishes for leather goods etc. and make them available in sufficient quantities to the trade. These should be manufactured from indigenous raw materials. An allout effort by C.L.R.I. with other national laboratories in India in this direction will be of immense and immediate benefit to the trade. One would even suggest the floating of a separate manufacturing Corporation for this purpose with participation by C.L.R.I., State and Central Governments and finished leather manufacturers. Such a Corporation can fully and exclusively exploit processes developed here and the fruits will be common to all finished leather manufacturers. This seems to be more important at the moment than any pure research or development of new processes of leather manufacture.

Another important service that C.L.R.I. could do to the trade is to do a more thorough abstracting of all technical papers and information published in various parts of the world and include them in C.L.R.I. Bulletin. Also attempts should be made to translate into English standard and latest text-books on leather technology and to publish them in India.

The highest priority should be given to devise ways and means to reduce human labour and drudgery in tanning work and replace it by chemical and mechanical aids. A higher productivity must be aimed at. Actually in the speaker's tannery, the number of skilled operations in pretanning have been reduced from 5 to 2, i.e. one fleshing and one scudding for chrome tanned cow hides.

The finished leather industry in India now requires inspired efforts from technologists to a greater extent than from scientists. Since this industry is not yet highly developed, the scientists in C.L.R.I. have a golden and unique opportunity of combining in themselves the roles of both technologists and scientists. It is upto the industry and the research staff of C.L.R.I. with extensive training and education and considerable facilities at their disposal to accept the challenge and contribute to the welfare of the masses by producing better and cheaper leather with more utility and aesthetic appeal.

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" is being 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. VIII. It is understood that a substantial quantity of goat hairs produced in the hilly regions is being exported to foreign countries and that strong ropes for use in ships are made out of these. How are the ropes prepared?

Answer: The hair is graded for strand length and colour. Strand length varies from 6" to 12". Strands longer than 12" are handled separately and spun into short ropes. After the hair has been graded, it is washed and dried. The mixture of hair after preliminary treatment is run through a picker two or three times, to separate the individual hairs, fluff the mixture and also to make it uniform.

Twisting: The mixture is twisted into long ropes. The operator fills a basket with hair and engages a handful of it upon a revolving hook. He then backs away from the hook, holding the revolving rope of hair with one hand and with the other gradually feeds more hair from the basket into the rope. The poorer the grade of the mixture, the longer the diameter of the rope. This procedure creates a curl of tiny spirals throughout the entire length of the rope which finished is about 80 foot long. Next the ends of these 80 feet ropes are jointed together and plaited into 40 foot strands. The ropes are then sterilised by steaming and then dried.

Uses of the curled hair: Curled hair is used for air-filters for mattresses and furniture, cushions in pullman sleepers, ocean liners and motor boats. Due to its comparatively high cost, many substitutes have been offered for curled hair. Curled hair however has some outstanding advantages over their substitutes in that it is nonabsorbent, nonheating and permanently soft and resilient.

CLASSIFIED ABSTRACTS

VEGETABLE TANNING

Condensed tannins. 8. The isolation and distribution of inter-related heartwood components of *Schinopsis* spp.

D. G. Roux and E. Paulus (Leather Industries Research Institute, Rhodes University, Grahamstown, South Africa) *Biochem. J.* 78, 785 (1961). (±)—Fustin has been isolated from the heartwoods of *Schinopsis balansae*, *Schinopsis quebracho-colorado* and from commercial quebracho extract. (—)—Fustin predominates (66%) in the extract of *S. balansae* and in the commercial extract. Other known and some related components have also been isolated by means of Craig counter-current separations followed by adsorption separation on cellulose. The radial and vertical distribution of (—) 7:3':4'-trihydroxy-flavan-3:4-diol, (+)—catechin, gallic acid, (±)—fustin, fisetin and 2-benzyl-2-hydroxycoumaran-3-ones in the heartwood of *S. quebracho-colorado* has been estimated. The possible role these compounds play in the biogenesis of tannins and the interconversions of the compounds related to (—) 7:3':4'-trihydroxyflavan-3:4-diol are discussed.

Condensed tannins. 9. Distribution of flavonoid compounds in the heartwoods and barks of some interrelated wattles.

D. G. Roux, E. A. Maihs and E. Paulus (Leather Industries Research Institute, Rhodes University, Grahamstown, South Africa). *Biochem. J.* 78, 834 (1961). The distribution of flavonoid compounds in the heartwoods and barks of four wattles (*Acacia* spp.) has been studied. (—)-Fisetinidol, (+)-fustin, (+)-7:3':4'-trihydroxyflavan-3:4-diol, fisetin and polymeric leucofisetinidin tannins are common components to the heartwoods of *A. mearnsii* (*A. mollissima*: black wattle), *A. decurrens* (green wattle), *A. dealbata* (silver wattle) and *A. pycnantha* (golden wattle). The barks of *A. mearnsii* and *A. decurrens* contain (—)-robinetinidol, (+)-catechin and (+)-gallocatechin; *A. dealbata* contains these catechins together, with (—)-epicatechin and (—)-epigallocatechin, and *A. pycnantha* contains these together with (—)-epicatechin, (—)-epicatechin gallate, (—)-epigallocatechin, (—)-epigallocatechin gallate and gallic acid. The possible significance of the relative distribution of heartwood and bark components to the taxonomy of these wattles is discussed.

TESTING

Determination of lysine, arginine and histidine by high temperature paper chromatography

S. M. Sibalic & N. V. Radej, *Anal. Chem.* 33, 1223 (1961). Basic amino acids in casein hydrolysate were determined by first adsorbing them on cation exchange column in the ammonium form, then eluting with 3N ammonium hydroxide solution and finally separating by horizontal paper chromatography. The separation was made on filter paper buffered with phosphate buffer of pH 6.8 with phenol saturated with phosphate buffer at the same pH as the developing medium at 40°C for 3 hours. The amino acids separated were located with ninhydrin, the spots were cut out and eluted with a mixture of ethanol and water; the absorbance at 570mμ was read. The standard curve was obtained by a parallel run with standard solution of the respective amino acids.

D. R.

Semimicro determination of total fatty acids and unsaponifiable matter.

James H. Benedict (Ivorydale Technical Center, Procter and Gamble Company, Cincinnati, Ohio), *J. Am. Oil Chemists' Soc.* 37, 415 (1960). A semimicro method for determining both total fatty acids and unsaponifiable matter in fats, fatty acids, and soap is presented. The procedure involves saponification and recovery of the total fatty acids (which includes the unsaponifiables), removal of the fatty acids with anion exchange resins, and determination of the unsaponifiable matter by weight.

The total fatty acid method was evaluated on seven samples and showed a standard deviation from the mean of 0.21%. The unsaponifiable matter determination gives good reproducibility with a standard deviation from the mean of 0.06%. Since this ion exchange is a direct determination of the non-ionic components, the results obtained from it should be more accurate and more nearly the true values than the macroextraction method which is empirical.

Quantitative gas chromatography of fatty derivatives. Relative detector responses to C₆-C₁₄ saturated methyl esters.

J. V. Killheffer Jr. and Eric Jungermann, (Armour Industrial Chemical Company, Chicago, Illinois), *J. Am. Oil Chemists' Soc.* 37, 456 (1960). The relative response of a thermal conductivity cell, in terms of peak area produced per mole of compound, has been

determined for the fatty methyl esters caproate through myristate. The values were found to be a linear function of molecular weight.

The absorption of cationic surfactants by cellulosic materials. 1.

The uptake of cation and anion by a variety of substrates.

Frederick H. Sexsmith and Howard J. White, Jr. (Frick Chem. Lab., Princeton Univ., Princeton, New Jersey and Textile Res. Inst., Princeton, New Jersey), *J. Colloid Sci.* **14**, 598 (1959). The interaction between cationic surfactants and cellulosic fibers has been studied. Most of the work involves cetyltrimethylammonium bromide (CTAB) and four substrates: kieran cotton, a medium-high-tenacity viscose rayon, a viscose rayon monofil, and oxycellulose. Absorption isotherms for the cation and anion of the surfactant were measured and some attention was given to rates of absorption and to the effects of temperature added electrolyte and solubilized dyes. Two major absorption processes occur in the concentration range studied: cation exchange and ion-pair absorption. The cation exchange is dependent on the exchange capacity of the substrate. The ion-pair absorption begins to become important in the vicinity of the critical micelle concentration of the surfactant and also seems to depend on the cation-exchange capacity of the substrate. If the ion-pair absorption is assumed to consist of a clustering of ions on exchanged long-chain cations, the results for all but very high ionic strengths can be explained. In the presence of large amounts of added electrolyte an additional ion-pair absorption seems to occur.

The design of methods for testing the fastness to rubbing of light leathers under various conditions.

D. Grimwade and S. Wolstenholme, *J. Soc. Leather Trades' Chemists*, **45**, 276 (1961). The development of the Society's Official Methods for measuring the fastness of light leathers to dry rubbing, to wet rubbing and to rubbing when wetted from the back with organic solvents is described. Attention is drawn to the work of the International Fastness Tests Commission with the Crockmeter and a comparison of the Crockmeter with the S.A.T.R.A. machine accepted by the Society is given in detail. Many other relevant experimental results are recorded.

An examination of the rub test for the determination of the fastness of leather finishes

A. W. Landmann, R. G. Mitton and F. R. Morgan, *J. Soc. Leather Trades' Chemists*, **45**, 291 (1961). An account is given of the work carried out at the B.L.M.R.A. Laboratories which led to

suggestions for the improvement of the reproducibility of the test for rub fastness and which were included in the S.L.T.C. official method.

The design of a method for testing the fastness of coloured leathers to marking off.

C. F. Kirkpatrick, *J. Soc. Leather Trades' Chemists*, **45**, 318 (1961). The adaptation of an earlier form of the test is described, together with the experimental results obtained.

Techniques in tissue metabolism. 5. Chopping and slicing tissue samples.

H. McIlwain (Department of Biochemistry, Institute of Psychiatry (British Postgraduate Medical Federation, University of London, Maudsley Hospital, London, S.E. 5)). *Biochem. J.* **78**, 213 (1961). The tissue chopper previously described has undergone development and has been further applied. For slicing tissues, the preparation and use of a simple guide is described. A bow cutter is described for use with the guide when cutting tissue in the absence of added aqueous fluid.

Spot-line chromatography: A technique for studying interactions between proteins and dyes.

A. G. Cairns-Smith (Department of Chemistry, The University, Glasgow, W. 2) *Biochem. J.* **78**, 449 (1961). Binding between proteins and other molecules can be studied by allowing a spot of protein to overtake a line of a second component in a suitable supporting medium. Binding may be shown by a distortion or loop in the line. This effect has been used to screen a number of dyes for interaction with bovine serum albumin and ovalbumin. It has been shown that under ideal conditions the area of the loop formed by a given protein in a given line of dye should be proportional to the total weight of active protein in the spot. This has been verified as being approximately true for the bovine serum albumin-Biebrich scarlet system, but with one important reservation. As bovine serum albumin molecules move across filter paper, their binding power for Biebrich scarlet falls to about 10% of the initial value. This seems to be due to adsorptive interaction between the protein and the paper.

A method for separating neutral amino acids from neutral oligopeptides.

P. R. Carnegie (The Rowett Research Institute, Bucksburn, Aberdeen, Scotland, and Ruakura Animal Research Station, Department of Agriculture, Hamilton, New Zealand) *Biochem. J.* **78**, 687

(1961). Monocarboxylic monoamino acids have been separated from their dipeptides on a column of anion-exchange resin eluted with ammonium acetate buffer, pH 8.65. The peptides are retained on the resin and later eluted with acetic acid. A semi-quantitative technique with two-dimensional chromatography-ionophoresis on filter paper was devised for assessing the results of these separations. The presence of carbon dioxide interfered with the separations and it is suggested that this was due to formation of carbamino acids. The possible role of such compounds in the biosynthesis of proteins is discussed. With juice expressed from ryegrass the procedure was useful for removing free amino acids from peptide-like compounds of low molecular weight which it was desired to study in greater detail.

A method for the chromatographic detection of penicillins and related compounds and of penicillinase.

P. H. A. Sneath and J. F. Collins (National Institute for Medical Research, Mill Hill, London N.W. 7) *Biochem. J.* **79**, 512 (1961). A method is described for the chromatographic detection of penicillins and related compounds and of penicillinase based on the reaction of iodine with penicilloic acids.

Chromatographic methods for the study of amines from biological material

K. Blau (Biochemistry Department, University of London King's College, Strand, London, W.C. 2). *Biochem. J.* **80**, 193 (1961). A method has been developed for treating biological fluids and extracts with ion-exchange resins to prepare a fraction consisting predominantly of the amines. The resolution of this fraction has been obtained by the use of buffered columns of a weakly acidic ion-exchange resin. Amines separated in this way have been isolated as their hydrochlorides by a chromatographic desalting technique, and identified by paper chromatography and paper electrophoresis. The scope of these methods is illustrated with reference to the analysis of amines in urine, and figures are presented for the excretion of piperidine, dimethylamine and methylamine, both normally and after fasting.

THEORIES

Formation of labelled amino acids by exchange transamination.

R. G. Hiller and D. A. Walker (Queen Mary College, University of London, London E. 1) *Biochem. J.* **78**, 56 (1961). In the presence of phosphoenolpyruvate, L-aspartate and an extract of

Kalanchoe crenata, $^{14}\text{CO}_2$ has been introduced into the β -carboxyl group of L-aspartate. The reaction is attributed to an initial carboxylation of phosphoenolpyruvate to yield oxaloacetate followed by an exchange transamination in which aspartate functions as the amino donor. The rate of accumulation of ^{14}C in aspartate has been compared with that of the corresponding reaction, in which the initial carboxylation is followed by a normal transamination in which glutamate serves as the amino donor, and has been shown to be more rapid. The rate of the normal transamination between glutamate and oxaloacetate has been compared with that of the exchange transamination between glutamate and α -oxoglutarate in reactions catalysed by an enzyme from *Ricinus* mitochondria. The results have been discussed in relation to their bearing on $^{14}\text{CO}_2$ -feeding experiments.

Some studies on the occurrence of sialic acid in human cartilage.

A. J. Anderson (Department of Pathology, Institute of Orthopaedics, Royal National Orthopaedic Hospital, Stanmore, Middlesex) *Biochem. J.* **78**, 399 (1961). The specificities of the diphenylamine and resorcinol reactions for sialic acid in the presence of protein and acid mucopolysaccharide components were investigated, and the violet and blue chromogens absorbing strongly at 525 m μ and 575 m μ respectively were found specific for this compound. Disintegration of human cartilage was carried out mechanically at -196° and the amounts of water-soluble material extractable at three pH values were determined. Sialic acid-containing components were present in these fractions, increasing amounts of which could be extracted from cartilage as the pH was increased. Three fractions were extracted from the disintegrated cartilage; a major fraction at pH 10.6 and two smaller fractions at pH 11.6. Analysis for protein, sulphate, sialic acid, hexosamine and total non-nitrogenous hexoses accounted for 85% by weight of the total solids. No sulphur-containing amino acids were detected. Sialic acid was detected in certain mucopolysaccharide-peptide complexes. The difficulties attending the separation of protein from acid mucopolysaccharide preparations were found to apply equally to the removal of the sialic acid-containing components. The significance of this is discussed.

The chemistry of connective tissues. 6. The constitution of the chondroitin sulphate-protein complex in cartilage.

S. M. Partridge, H. F. Davis and G. S. Adair (Low Temperature Research Station, Downing Street, Cambridge) *Biochem. J.*

79, 15 (1961). The polysaccharide chain weight (C_n), estimated by measuring the reducing power of the terminal residue, was compared with the osmotic molecular weight (M_n) for chondroitin sulphate-protein complexes extracted from bovine hyaline cartilage. Water extracts prepared from fresh cartilage slices in a high-speed homogenizer yielded a chondroitin sulphate-protein complex containing approx. 75% of chondroitin sulphate having M_n 1.5×10^6 and C_n 50×10^3 . Thus the 'osmotic molecule' contained 20–100 chondroitin sulphate chains terminating in reducing residues. Removal of protein by digestion with papain decreased M_n to $28 \times 10^5 \pm 2000$ and C_n remained unchanged. The result indicates that the chondroitin sulphate chains in the complex are linked together by protein and that the reducing terminals of a proportion of the chondroitin sulphate chains freed by papain are masked. When the native complex was treated with ovine hyaluronidase and the chondroitin sulphate chain fragments were removed by ultrafiltration, the chondroitin sulphate content of the remaining core was decreased to about 30% and C_n was 7730. The protein-rich core had M_n 170×10^3 , showing the presence of 23 chondroitin sulphate chains of decreased length. The complex had approximately the same reducing power before as after treatment with hyaluronidase and ultrafiltration, thus showing that each chondroitin sulphate chain is attached to protein at one point only. It is concluded that the complex may exist in solution as a macromolecule of M_n 1.5×10^6 or an aggregate of smaller molecular units of M_n at least 750×10^3 . The units contain at least 23 chondroitin sulphate chain of C_n 28×10^3 . These are connected to a protein core by a single linkage which does not involve the terminal reducing residue.

The metabolism of protocatechuic acid by a *vibrio*.

R. B. Cain (Department of Biochemistry, University of Leeds) *Biochem. J.* 79, 298 (1961). Protocatechuic acid is oxidized by crude extracts of *Vibrio* O1 to β -oxoadipic acid; partially purified extracts yield stoichiometric amounts of β -carboxymuconic acid. Heat-treated extracts of the *vibrio* accumulate a lactone from either protocatechuic acid or β -carboxymuconic acid. The lactone has been isolated and identified as (+)-4-hydroxyhex-2-enedioic 1 $\rightarrow$ 4-lactone ((+)-muconolactone). Enzymic synthesis of (+)-muconolactone from β -carboxymuconic acid is accompanied by loss of carbon dioxide. Neither *cis-cis*-muconic acid nor β -carboxymuconolactone is attacked by *vibrio* extracts grown with *p*-hydroxybenzoic acid as carbon source, so the lactonization and decarboxylation appear to occur simultaneously. Some properties

of the lactonizing and delactonizing enzymes are described and compared with similar enzymes from other micro-organisms. In particular, a metal requirement and sulphhydryl groups are associated with the lactonizing enzyme of *Vibrio*, the amount of which in cells is markedly increased by growth on *p*-hydroxybenzoic acid. The significance of symmetric and asymmetric lactones is discussed in relation to new and distinct modes of aromatic ring fission.

The composition of collagen from subcellular fractions of guinea-pig granuloma tissue.

J. E. Eastoe (Department of Dental Science, Royal College of Surgeons of England, London W.C. 2) *Biochem. J.* 79, 648 (1961). The amino acid composition of subcellular fractions of collagen, obtained by differential centrifuging of homogenized guinea-pig granuloma and purified by extraction with 0.2M-sodium chloride solution, has been determined by using a semi-micro modification of the ion-exchange chromatographic method of Moore and Stein. The collagens from the nuclear and mitochondrial fractions were closely similar in composition to both insoluble collagen from ox bone and neutral-salt-soluble collagen from rabbit skin. These fractions had been shown by electron microscopy to be heterogeneous and to contain both striated and plain fibres. Collagen from the relatively homogeneous microsomal fraction had the same overall amino acid pattern as insoluble collagen but with quantitative differences, suggesting the presence of 15–20% of protein impurities. It is suggested that the non-fibrillar collagen, synthesized in the microsomes and which is almost completely soluble in 0.2 M-sodium chloride solution, is similar to and possibly identical with the fibrils of insoluble collagen as regards amino acid composition.

Aromatic biosynthesis in higher plants. 1. Preparation and properties of dehydroshikimic reductase.

Doris Balinsky and D. D. Davies (Botany Department, University of London King's College, London) *Biochem. J.* 80, 292 (1961). A triphosphopyridine nucleotide-linked enzyme catalysing the interconversion of dehydroshikimic acid and shikimic acid was extracted and purified from etiolated epicotyls of pea seedlings. An overall purification of 78-fold was obtained. The pH optimum for the oxidation of shikimic acid was found to be 10.0. The Michaelis constant for shikimic acid at pH 9.0 was 0.19–0.28 mM. The Michaelis constant for triphosphopyridine nucleotide at pH 9.0 was 7 μ M. The purified enzyme preparation appeared to have no multivalent-ion requirement. The enzyme was inhibited by *p*-chloro-

mercuribenzoate with reversal of inhibition by cysteine. Iodoacetate was slightly inhibitory.

Occurrence of pyrrole-2-carboxylic acid in hide hydrolysates and its bearing on the determination of hydroxyproline.

C. Deasy (Tanners' Council Research Laboratory, University of Cincinnati, Cincinnati 21, Ohio) *J. Am. Leather Chemists' Assoc.* 56, 357 (1961). Pyrrole-2-carboxylic acid was found in hydrolysates of a steer-hide corium collagen preparation by paper chromatographic methods. It is probably formed by decomposition of a sialic acid of the hide during the acid hydrolysis. Since pyrrole-2-carboxylic acid reacts with *p*-dimethylaminobenzaldehyde to give a coloured product that absorbs at 560 mμ, it will contribute to the apparent amount of "hydroxyproline" found by the Neuman-Logan method of analysis. However, the small amount present in hide hydrolysates will not increase the apparent hydroxyproline content significantly: in samples with relatively high sialic acid and relatively low hydroxyproline contents, it might, however, become a significant factor.

BY-PRODUCTS

Amide nitrogen content of gelatins.

J. E. Eastoe, Joan E. Long and Alice L.D. Willan (The British Gelatine and Glue Research Association, 2A Dalmeny Avenue, London, N. 7) *Biochem. J.* 78, 51 (1961). A rapid and convenient method for the determination of amide nitrogen in gelatin, based on preliminary hydrolysis with 2N hydrochloric acid, is described. No significant decomposition, resulting in release of non-amide ammonia, occurs during the distillation stage. Errors resulting from the distillation of carbon dioxide have been decreased to a low level. The method of hydrolysis gives results very close to those obtained with 12N hydrochloric acid at 37°. The amide contents of a series of deionized gelatins, ranging from pI 4.80 to 9.4, are related to their isoionic points by a curve of similar shape to the titration curve. Certain gelatins and glues that show evidence of containing polysaccharide impurities give rise to larger quantities of ammonia on hydrolysis than would be expected from their isoionic points.

The leaf protease of *Trifolium repens*.

C. J. Brady (Commonwealth Scientific and Industrial Research Organisation, Fodder Conservation Section, Highett, Victoria, Australia) *Biochem. J.* 78, 631 (1961). Nitrogen catabolism in sap

expressed from leaves of *Trifolium repens* has been studied, and the use of the increment in α -amino content as an index of protein hydrolysis in the leaves is discussed. A considerable variation in the rate of release of α -amino nitrogen in different samples of sap was found. A fraction showing about five times the protease activity of fresh sap has been prepared by removal of relatively inactive protein. Some characteristics of the hydrolysis of endogenous protein and gelatin by the crude enzyme, and of gelatin by the concentrated enzyme, were examined. With endogenous substrate, peptides accumulated briefly in the medium, then rapidly disappeared. With relatively high concentrations of gelatin substrate there was a marked accumulation of peptides in the medium. The protease showed a broad pH optimum of 5.9-6.3; no activity could be detected at values lower than pH 4.0. The crude enzyme was rapidly inactivated at pH values below 5.0, but stability was not affected by pH values between 5.0 and 7.0. In the concentrated condition the enzyme was much more stable on storage. Reducing agents enhanced activity on endogenous substrate but not on gelatin. Chelating agents and heavy-metal ions were the most active of a number of possible inhibitors examined.

Purification of latent phenolase from broad-bean (*Vicia faba*) leaves.

J. Leggett Bailey (The Rowett Research Institute, Bucksburn, Aberdeen) *Biochem. J.* 79, 514 (1961). Latent phenolase from broad-bean leaves may be removed from pigments and the major protein components of the leaf juice in one operation by gradient elution from a column of diethylaminoethylcellulose. Rechromatography of the enzyme on the same adsorbent yields a preparation of high catecholase activity in 90% overall yield. Unlike other known active phenolases the enzyme released from a broad-bean leaf extract by Teepol is adsorbed strongly on diethylaminoethylcellulose.

NOTES AND NEWS

New Sheepskin Grain by Hoyt and Worthen

Hoyt and Worthen Tanning Corp., Haverhill, Mass. has developed a new leather that, according to a company spokesman, is the answer for cushion covered innersoles. This new leather is a backed sheepskin grain, aniline finish leather.

The manufacturer states that when wrapped around cushion covered insoles and cemented it roughs easily and evenly to make a smooth foundation for the finished shoe.

Leather and Shoes: Feb. 4, 1961.

Cal-tan Research Patents Offal Emulsion

The U.S. Patent Office has issued a patent for the process of converting tannery offal into a fat and protein emulsion to Cal-Tan Research Products Corp. in Napa, Calif.

The firm announced it is now ready to negotiate with interested parties for the use of the Patented process.

Leather and Shoes: Feb. 11, 1961.

New Dryer Techniques are aired; Suede Kid dried in 22-26 minutes

Automation in leather production is advancing but the skilled tanner is needed more than ever. This view-point was emphasized at the panel discussion which followed the March dinner of the Delaware Valley Tanner's Club in Philadelphia March 9. "New Drying Methods" was the billed subject for the discussion, but questions and answers often carried it beyond this to deal with a complexity of technical problems.

Jack Aulson of the Aulson Tanning Machinery Co., and Vincent Delack of the Allied Kid Co. were moderators. Aulson pointed out there is a completely new concept of the machines needed for modern leather production.

Many questions asked about the new Roll-A-Flex drying machine were answered by Aulson, Delack, and Miller of Seton Leather. The need for such a machine became urgent about two years ago, it was reported. When finally completed on the drafting boards it was found too massive for the Aulson Co. to handle; so actual production was delegated to the Morrison Machinery Co.

The actual machine is vertical and three stories high. It consists of rollers, two conveyor belts or "blankets" and heated by temperature controlled steam. The 60 lb. steam pressure gives a temperature of 250 degrees. This may be adjusted up or down by regulating the steam pressure. As leather is passed over the dryer it is stretched and flexed.

Delack reported that glazed and suede kid leather are dried on the machine in operation at Allied Kid in 22-26 minutes, saving hours of time on older drying methods. The machine has been in operation there since September. Much better results are obtained if it is kept in continuous 24 hour operation, he said. Only indefinite answers could be given as to the cost of the dryer. On estimate given was that production cost could be reduced by 4c a foot and an annual saving of \$96,000 is possible with one machine.

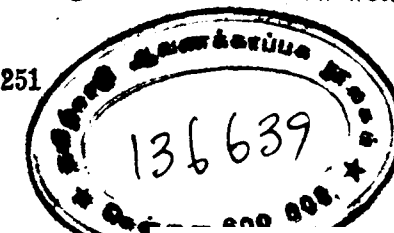
In answer to questions regarding its use with side leather, the 5 to 7 ounce weights have been dried at the rate of two feet per minute with a potential of 10 feet per minute possible by using a wider belt of around 70 inches.

A continuous barrage of technical questions were asked regarding potential production of the dryer. Only two machines are now in operation. The other one is at Endicott-Johnson. In answer to questions on bleeding it was stated that blue dyed suede kid has been run through the machine followed by beige without having any trouble with bleed or stain.

Leather and Shoes: March 18, 1961.

Hide Soak shorter with new chemical

More packs of green salted hides can be soaked in fewer paddles or drums, thanks to a new chemical, Hide-Tergent, recently marketed by Sanford Chemical Co., of Chicago. A company spokesman recently reported that tanners can now soak two packs of hides per day in the same paddle or drum through the use of the new wetting agent.



This soaking with the low foaming, high penetrating wetting agent cuts soaking time to two to three hours. Hides can be fleshed uniformly and readied for the unhairing and liming operations. This process supplants the usual over-night cold water interval.

Sanford reports tanners using the new chemical now have more paddles and drums for use in liming or bating. And the resultant leathers have a finer, lower grain pattern with solid flanks and bellies.

The chemical firm has found that 2½ lbs. of Hide-Tergent per 1000 lbs. of green salted hides at soaking temperatures between 75°-85°F produces ideal results. Hide-Tergent is available in 55 gallon drums.

Recommended procedures: Wash 3,000 lbs. of green salted hides at 75°F for 20-30 minutes. Then soak stock at 82-85°F. Add Sanicide, 0.1%. Add 7½ lbs. Hide-Tergent. Mill paddle or drum for 60 minutes. Soak 60 minutes. Run paddle or wheel 45 minutes. Wash at 82-85° for 30 minutes. Pull and green flesh. Hides are now ready for liming and unhairing.

Leather and Shoes: March 18, 1961.

New Leather Product added by William Amer

An unique product has been added to leather styling—it is full chrome-tanned leather in which the original raw hide is unhaired in predetermined areas to form unusual designs after which the skin, with special treatment, is carried through the usual stages for chrome-tanning through colouring.

The patent granted to Dr. Frank W. Panepinto, Technical Director of the William Amer Company to whom he assigns the patent, includes not only goatskins and kangaroo, in which this company is famous for its King Kid and King Kangaroo, but also all hairbearing animals whether they be calf, cow, horse, sheep, etc. or the exotic fur-bearing animals such as sable, ermine, persian lamb etc.

The product trademarked Furbello lends itself to use in shoes, handbags, belts, hats, trim etc. in a variety of exciting colour combinations of hair and leather; for example there is black hair with the leather in yellow, green, blue, black etc. or there is white hair with the leather in black, brown, red, tan and so on.

The product lends itself also to unique advertising since the message may be outlined in the original hair of the animal.

Leather Manufacturer: April, 1961.

Italian trend travels in new Leathers

As far as shoes are concerned leather usage in Italy is—and will be—undergoing some interesting changes.

A roving eye reports several new trends from Bologna and Parabiaga shoe makers which will be evident in the winter collections this year.

First, suede is regaining popularity, but is always to be seen in company with textures such as matt-calf or reptile; this re-emergence of suede reflects a widening use of two-texture combination on all types of shoes.

Pearlised leathers are losing their popularity, while patent continues as a firm favourite, often in a golden-beige.

Shrunk grain leathers are the new sensation for men's shoes.

A prevalence has been seen of matt-finish leathers and novelty finishes of matt-calf includes shadow-stripes and wood-grain effects.

Leather Trades Review: May 3, 1961.

Export of Goatskins from Calcutta during Feb. 1961.

During the month of February, 1961 approx. 1,984,000 pieces Indian goatskins were exported from Calcutta (compared with about 1,772,000 for the same period last year). Actual quantities were:

Dry-salted:—about 1,786,000—to the U.K. about 42,000, to the Continent about 1,694,000, to the U.S.A. about 50,000.

Wet-salted:—about 192,000—to the U. K. about 13,000, to the Continent about 119,000, to the U.S.A. 60,000

Kidskins:—about 6,000—to the Continent.

Of the overall total about 1,598,000 pieces were dispatched to Eastern European countries.

Leather Trades Review: May 3, 1961

Export of Goatskins from Calcutta during March, 1961.

During the month of March 1961 approximately 1,124,000 pieces Indian goatskins were exported from Calcutta (compared with about 1,015,000 for the same period last year).

Dry-salted:—about 933,000: to U.K. 27,000; to Continent 896,000; to U.S.A. 10,000.

Wet-salted:—about 167,000: to U.K. 14,000; to Continent 113,000; to U.S.A. 40,000

Leather Trades Review: May 10, 1961.

West German Leather Industry

Output in the leather industry as a whole totalled 5,872 tons in February (provisional) against 6,209 tons (revised) in January, and in the first two months 12,081 tons (provisional) against 11,340 tons in the corresponding period of 1960.

Leather shoe imports in 1960 totalled 7,157 tons worth 155,424,000 marks (provisional). December imports amounted to 524 tons, worth 10,028,000 marks. Shoe imports in January of this year totalled 529 tons worth 11,913,000 marks (provisional).

Leather Trades Review: May 10, 1961.

Thixotropic Adhesive

Adhesive and Allied Products Ltd. (U.K.) have developed a new type of sole cement in which the normal properties of their well tried 3-D No. 472 are enhanced by the introduction of a thixotropic agent designed to allow the cement to flow as a normal solution when brushed or pumped and to remain in place, retaining its shape and form, as soon as the applying force is removed. This is 3-D Cement No. 4724, said to be the first Neoprene sole cement with thixotropic properties.

Australasian Leather and Footwear Review: May, 1961.

Breatheable Polymeric Footwear Material

Du Pont's new *breatheable* polymeric footwear material suitable for shoe, uppers, under development for the past 10 years, is expected to go into pilot production next autumn in the U.S.

Full scale production cannot be expected in the normal two year period needed to build a multi-million dollar plant because entirely new manufacturing equipment had to be designed for the shoe upper material.

William E. Kreuer, a divisional director of sales for Du Pont, has said that the material was still in the hands of the research department and would not be put on the market until the company was certain that its market acceptance was assured and other problems overcome.

Du Pont apparently is leaving nothing to chance, for according to Mr. Kreuer costly market research on all levels is being conducted, including consumer buying habits, service testing, retailer studies and panel testing.

Du Pont expects the new upper material to compete with conventional leather materials but, as some solace to tanners, Du Pont considers there will be always be a substantial market for established present-day products.

Du Pont's product development programme included more than 20 large, medium and small shoe manufacturers. This number would be expanded as the new material was tested in different types of footwear.

Australasian Leather and Footwear Review: May 1961.

Spruce Bark—A Source of New Materials

Spruce bark, which up to now has been a waste product of the pulp and paper industry, shows promise of becoming a useful source of tanning materials.

Work presently being conducted at Ontario Research Foundation, Toronto, has shown that an extract from spruce bark can be used to replace the conventional vegetable tanning agents, such as Wattle or Quebracho, or mixed with them to produce better leathers.

One trial, involving 300 square feet of material, produced a leather which, in the opinion of skilled industrial tanners, had a superior "break" to leather retanned with conventional materials. ("Break" is a trade term referring to the wrinkling effect caused by bending the leather.) Another trial has indicated that the spruce bark extract can be mixed with conventional tanning agents with favourable results.

At present, Ontario Research Foundation is investigating a new process which uses the dried extract for tanning leathers. If successful, this method will have a great impact on the industry: the tanning time will be reduced to approximately 1/10 of present requirements, the wastage of tanning agent would be virtually eliminated, and the effluent from the tanning factory—always a headache to tanners and local water pollution authorities—will be considerably reduced.

Conventional vegetable tanning agents have to be imported from either South America or South Africa. In 1958, Canada imported about \$1,130,000 of vegetable tanning materials for the leather industry alone. In the same year, U.S. imports for this purpose probably amounted to over \$11 million. Since it is expected that the spruce bark extract will be priced competitively with the imported

vegetable tannins, this research project may result in a complete new industry for Canada.

Spruce bark from the pulp and paper industries is presently burned or stockpiled. Hence, the price of the extract is kept low because of the low cost of the starting material. Ontario Research Foundation scientists have calculated that one ton of bark will yield over 500 pounds of extract.

The research has been under the direction of W. C. Henry, director of the Foundation's Department of Bio-chemistry, and has been supported in part by the Defence Research of the Department of National Defence (Canada).

Leather Manufacturer: June 1961.

Brining before fleshing

Mr. Lee Lyons, hide man from Kansas City, put forth at the final spring meeting of the Tanners Production Club of Canada, the following reasons for brining before fleshing: 1. To preserve the raw hide until it can be handled by the fleshing machine. 2. A 10% Brine Solution is used and restrengthened several times a day. Constant salometer readings are taken. 3. The bacterial Count of Brine Solution is carefully checked. 4. Fungicides are incorporated, being sprayed on the flesh and hair side of the hide immediately after fleshing. 5. Temperature of Brine Solution 65°F. 6. Hides are in Brine Solution 18-24 hours. 7. In the final trim there is about 21½% loss due to removal of non-leather making parts. 8. Hides are sorted and selected at the fleshing machine.

Leather Manufacturer: June, 1961.

World Cattle Estimates

The world cattle and buffalo population in 1961 is estimated at 1,011,000,000 head, 5,000,000 more than the previous year and 100,000,000 over the 1951-1955 average. This represents an increase of about 11 per cent during an 8-year period and is slightly more than the U.S. total.

Despite this general increase, numbers decreased 1% in North America, as well as in Asia. The slight decrease in North America is generally attributed to a sharp decline in numbers in Cuba, where, it is reported, there have been widespread changes in farm ownership . . . large ranches having been taken over by collective organizations.

Numbers increased, however, by 3 per cent in South America and Oceania, 2% in Eastern Europe, Western Europe, and the U.S.S.R., and 1% in Africa.

Cattle numbers continue to rise sharply in South America, particularly in Argentina. Five countries—United States, India, U.S.S.R. Brazil, Communist China—each have 60,000,000 or more head of cattle. Argentina is sixth largest with 46,000,000 head. Pakistan, Mexico, Ethiopia (including Eritrea) and France have numbers ranging from 30,000,000 to 19,000,000. Ireland was the only major country in Western Europe where cattle numbers decreased in 1960 after increasing steadily for several years. The slight drop in numbers in Ireland was due to the vigorous tuberculosis eradication programme and large export of beef and cattle.

Leather Manufacturer : June, 1961.

Wattle Research leads to varnish discovery

The Paint Industries Research Institute of Durban, South Africa, has produced a high quality varnish from wattle extract, it is disclosed.

Tests are being completed, but indications are the varnish can be produced at competitive prices. If results are favourable, the process will be offered free of charge to all paint manufacturers in South Africa so long as South African wattle is used.

The discovery is the result of three and a half years study. The study came as wattle growers and processors seek more outlets for wattle extract and bark sales. Sales in 1959 were \$17.3 million dollars, and in 1960 down to \$11.2 million, due to competition from quebracho from Argentina, and decreasing demands for leather.

Grants have been made to laboratories in Great Britain for study of foam plastics from wattle and for production of chemicals to add to bad water to induce suspended material to settle out.

Leather and Shoes : June 10, 1960.

Hide Unhairing Enzyme, Keratinase, discovered as economical effective

Rutgers University this week announced the discovery of keratinase, a new proteolytic enzyme which removes natural hair from hides and produces a better quality of leather.

The amount of enzyme required to dehair hides is not sufficient to cause appreciable digestion of the hair itself which is recoverable as a by-product used in the making of felt. The site of action of the enzyme in dehairing is at the base of hair shaft which is particularly sensitive to the enzyme.

The keratinase is produced by a strain of the micro-organism, *Streptomyces fradiae*. Other strains of this organism produce the antibiotic, neomycin.

Keratinase appears to be the first which is economically feasible for hair removal. The primary advantage of keratinase is that it does not affect the hide in the process of removing the hair. This means not only upgrading the quality of finished leather, but also better utilization of lower grade hides and skins. In addition, it also eliminates the tremendous waste-disposal problem involved with the use of lime and sulfide.

Leather and Shoes: June 10, 1961.

Review of India's Export Trade in Raw Hides and Skins

Hides and skins are available from almost every country in the world but the demand for meat sometimes determines the quantity of supply of hides and skins. The principal commercial varieties of hides and skins are obtained from cattle, sheep and goats. The biggest exporters of hides and skins in the world are Argentina and U.S.A. In 1958 Argentina's share in the total quantity of exports of hides and skins from all principal exporting countries was 25% and the share of U.S.A. was 23%. The share of the Commonwealth Countries was 31%. Australia was the biggest Commonwealth exporter followed by New Zealand, Union of South Africa and Canada. Pakistan, East Africa and India were also substantial exporters but their shares were smaller than those of the countries of European Economic Community excepting Italy. The E.E.C. countries are also major importers of hides and skins, their total imports in 1958 constituting about 48% of total world exports in that year. These countries import mostly cattle hides, sheep and lamb skins.

Production in 1951 in India was estimated at 15.9 million pieces of cattle hides, 5.2 million of buffalo hides, 21.3 million of goat skins and 15.5 million of sheep skins. Thus goat skins are the major

variety available for export from India. In 1958 India contributed some 1.5% to total exports of hides and skins from all countries. The total quantity of exports of hides and skins (except fur skins) from India increased by 9% in 1959 over 1958. Total exports in 1960 declined by 6% as compared to 1959. The value fetched by raw hides and skins (except fur skins) in 1960 declined to Rs. 10.1 crores for 12.2 million kgs. from the previous year's level of Rs. 10.7 crores for 13.1 million kgs. In 1958 the value obtained was Rs. 7.2 crores for 12 million kgs. USSR is the biggest importer of hides and skins from India. Shipments to that country increased appreciably to 6.1 million kgs. valued at Rs. 5.5 crores in 1959 and 6.3 million kgs. valued at Rs. 5.2 crores in 1960 from 3.7 million kgs. valued at Rs. 2.7 crores in 1958. The second biggest purchaser has been U.S.A. although her offtake declined from 5 million kgs. valued at Rs. 2.17 lakhs in 1958 to 3.6 million kgs. valued at Rs. 2.27 lakhs in 1959, 2.9 kgs. valued at Rs. 1.94 lakhs in 1960. In 1959, supply from India accounted for 8% of the total value of imports of hides and skins into U.S.A. Exports to Czechoslovakia steadily rose from 457 thousand kgs. valued at Rs. 43 lakhs in 1958 to 559 thousand kgs. valued at Rs. 56 lakhs in 1959 and 612 thousand kgs. valued at Rs. 82 lakhs in 1960. Exports to West Germany increased by 9% in quantity to 609 thousand kgs. and by 25% in value to Rs. 50 lakhs in 1959 as compared to 1958. In 1959 supplies from India represented 0.4% of the total quantity and 0.9% of the total value of hides and skins imported into West Germany. In 1960 the quantity of exports to Western Germany declined by 4% and value by 8% as compared to 1959. Shipments to Italy also declined in 1960. Compared to 711 thousand kgs. valued at Rs. 40 lakhs in 1958 and 762 thousand kgs. valued at Rs. 44 lakhs in 1959, the quantity came down to 423 thousand kgs. and valued to Rs. 23 lakhs in 1960. Exports to U.K. gradually declined from 813 thousand kgs. (Rs. 54 lakhs) in 1958 to 355 thousand kgs. (Rs. 38 lakhs) in 1959 and to 329 thousand kgs. (Rs. 24 lakhs) in 1960.

Leathers: Sept-Oct., 1961.

C.L.R.I. NEWS

Dr. Y. Nayudamma toured Madhya Pradesh from 13-11-61 to 25-11-61 to survey the tanneries and find out the potentiality for the development of the leather industry of the state.

Prof. Chandrasekhar visits C.L.R.I.

Dr. S. Chandrasekhar, Professor of Astrophysics, Yerkes Observatory, University of Chicago, accompanied by Mrs. Chandrasekhar, visited the Institute on December 10, 1961. He was taken round the tannery and the various laboratories of the Institute by Dr. Y. Nayudamma, Director, C.L.R.I. Addressing the staff of the Institute, Prof. Chandrasekhar expressed appreciation of the work being carried out at the Institute and wished them all success.

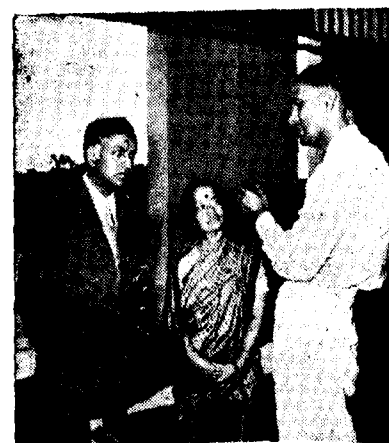
Prof. Chandrasekhar came down to India for a four months stay at the invitation of the Council of Scientific and Industrial Research, India. During his stay in India, he visited several national laboratories, research institutes and research laboratories and observatories. At Madras his programme included a series of six lectures on "Stability Problems in Hydrodynamics and Hydromagnetics" at the Department of Physics, University of Madras, two popular lectures "Physics and Astronomy" and "Cosmic Magnetic Fields" at the Presidency College, and a lecture on "Notion of Adjointness in Mathematical Equations" at the Ramanujan Institute. Dr. Chandrasekhar was conferred the Degree of Science of the Mysore University and was awarded the Ramanujan Gold Medel by the National Institute of Sciences, India.

Dr. Chandrasekhar has accepted the visiting professorship at the Institute of Mathematical Sciences, Madras, sponsored by the State Government, to be inaugurated by him on January 3, 1962.

Dr. Chandrasekhar was born in Lahore on October 19, 1910; his father was the late Mr. C. S. Aiyer and his uncle is the Nobel Laureate, Dr. C. V. Raman. Dr. Chandrasekhar took his M.A. from Presidency College, Madras, in 1930. He attended Trinity College, Cambridge, as a Government of India scholar in theoretical physics, and then as a research fellow; he got his Ph.D. in 1939 and followed it up with a D.Sc. in 1942. He became a Research Associate in the Yerkes Observatory, University of Chicago in 1937. Having served as Assistant Professor and Associate Professor in the same Observatory, he became a Professor in 1944, a Distinguished Service Professor in 1947 and later became the Morton D. Hull Distinguished Service Professor in 1952. In 1944 he was made a Fellow of the Royal Society of London; he is a member of several other distinguished scientific bodies. He is the recipient of the Bruce medal of the Astronomical Society, Pacific, Gold medal of the Royal Astronomical Society,

London and the Rumford medal. He is the author of "An Introduction to the Study of Stellar Structure"; "Principles of Stellar Dynamics"; "Hydromagnetic and Hydrodynamic Stability".

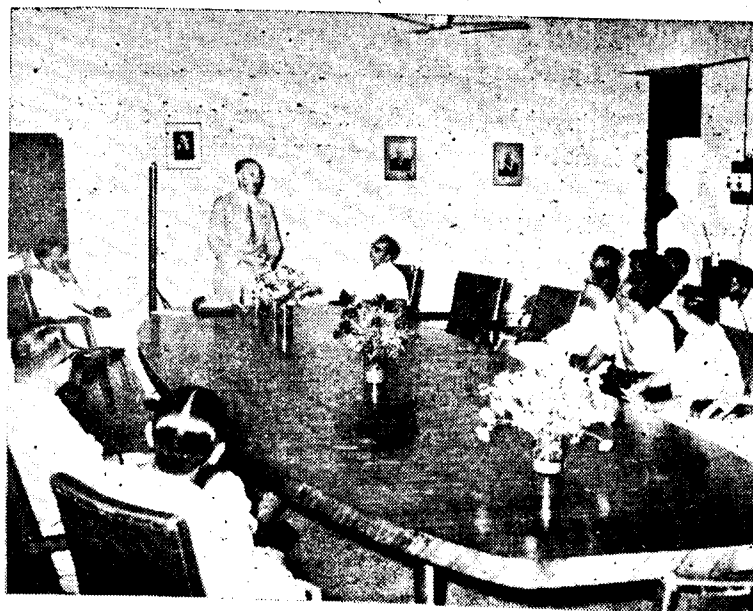
As a Distinguished Service Professor at the University of Chicago, he is not affiliated with any particular Department, even though his principal interests have always centred on theoretical astronomy. At the present time, he gives lectures in the Departments of Astronomy, Physics and Mathematics; guides students for the Ph.D. Degree. He has also been in charge of a laboratory in which experiments on the flow of liquids in the presence of magnetic fields are being carried out. At the present time, his interests seem to be shifting to problems in Relativity and Cosmology.



Prof. S. Chandrasekhar and Mrs. Chandrasekhar being taken round the Institute by Dr. Y. Nayudamma.



Mr. Ritchie Calder (centre), the noted science writer who visited the Institute on 25-11-1961.



Dr. E. C. Batesmith, of the Low Temperature Research Station, Cambridge, who visited the Institute on 27-11-1961 addressing the staff.



Mr. Nigel Calder, (left) the Editor of "New Scientist" who visited the Institute on 27-11-1961.

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

**காலணி அடித்தோல் (Sole Leather) துரிதமுறையில்
பதனிடுதல்**

தாவர—குரோம்—தாவரக் கூட்டுப் பதனிடு முறை

ஏ. கணேசன், டி. விஜயராமையா.

(குஜராத் மாநிலத்தில் ராஜ்கோட் என்னுமிடத்தில்
நேரில் செய்து காட்டப்பட்டது)

தனியாகத் தாவரப் பதனிட்டோ அல்லது குரோம் பதனிட்டோ காலணி அடித்தோல் தயாரிப்பதற்கான துரித முறைகள் முன்பே வெளியிடப்பட்டுள்ளன. இங்கு விளக்கப்படும் முறை கூட்டுப் பதனிடுமுறை (Combination tannage) ஆகும். சுண்ணாம்பு முழுவதும் நீக்கப்படாத தோல்கள் தாவரப் பதனிடு திரவத்தில் முன்பதனிடப்படுகின்றன. பின்னர் குரோம் பதனிடப்பட்டு, கடைசியாக வீர்யம் மிகுந்த தாவரப் பதனிடு திரவத்தில் மறு பதனிடப்படுகின்றன. இம்முறையினால் பதனிடுவதற்கான நாட்கள் குறைகிறது. இம்முறையைப் பின்பற்றித் தயாரிக்கப்பட்ட தோல்களின் தன்மையும் திருப்தி அளிப்பதாகவே உள்ளது. இம் முறையின் விளக்கம் கீழே கொடுக்கப்பட்டுள்ளது.

முறை விளக்கம்

கச்சாப் பொருள் :

சிங்கப்பூர் ஜாதியைச் சேர்ந்த, நன்றாக உலர்ந்த எருமைத் தோல்கள் எடுத்துக் கொள்ளப்பட்டன. இவற்றின் சராசரி எடை 9-10 கி. கிராம் (20-22 ராத்தல்).

நனைவு : (Soaking)

1-ம் நாள் :—சுமார் 800% தண்ணீர் ஒரு குழியில் நிரப்பப்படுகிறது. 100 விட்டர் தண்ணீருக்கு 0.1 கி.கிராம் (100 காலனுக்கு 1 ராத்தல்) என்ற அளவில் காஸ்டிக்

சோடா இத்தண்ணீரில் கரைக்கப்பட்டு, இதில் தோல்கள் இரவு முழுதும் விட்டு வைக்கப்படுகின்றன.

2-ம் நாள் : தோல்கள் பாளங்களாக்கப்படுகின்றன. பின்னர் மரத்தின் மேல் சீவப்பட்டு மேற் கூறிய கரஸ்டிக் சோடா கலந்த தண்ணீரிலேயே திரும்ப விடப்படுகின்றன. தேவையான அளவு காஸ்டிக் சோடா சேர்ப்பதன் மூலம் இக்குழியிலுள்ள தண்ணீரின் காரத் தன்மை சரிப்படுத்தப்படுகிறது.

3-ம் நாள் : பாளங்கள் இக்குழியில் நன்றாகப் புரட்டி விடப்படுகின்றன. பின்னர் பாளங்கள் வெளியே எடுக்கப்பட்டு, 100 லிட்டர் தண்ணீருக்கு $\frac{1}{2}$ கி. கிராம் (10 காலனுக்கு $\frac{1}{2}$ ராத்தல்) என்ற அளவில் சலவைத்தூள் (Bleaching powder) இக்குழியில் கலக்கப்பட்டு, பாளங்கள் மறுபடி குழியுள் போடப்படுகின்றன.

4-ம் நாள் : நனைவுத் தண்ணீரிலிருந்து பாளங்கள் வெளியே எடுக்கப்பட்டு, ஒரு காலிப் பீப்பாயில் போடப்பட்டு, பீப்பாய் $\frac{1}{2}$ மணி நேரத்திற்கு இயக்கப்படுகிறது. பின்னர் ஓடும் தண்ணீர் உள்ள பீப்பாயில் 2 மணி நேரத்திற்குக் கழுவப்படுகின்றன. இதற்குள் பாளங்கள் நன்கு நனைவு பெற்றிருக்கும். நனைவு எடை குறித்துக் கொள்ளப்படுகிறது.

சுண்ணாம்பிடுதல் :

5-ம் நாள் : ஒருமுறை உபயோகிக்கப்பட்ட சுண்ணாம்புத் தண்ணீரில் பாதி எடுத்துக் கொள்ளப்பட்டு அதே அளவு சுத்தமான தண்ணீர் அத்துடன் சேர்க்கப்படுகிறது. இதில் நனைவு எடையில் சுமார் 12% தாளித்த சுண்ணாம்புப் பசையும் 1% சோடியம் சல்பைடும் (Sodium sulphide) கலக்கப்படுகிறது. சுண்ணாம்புத் தண்ணீர் நன்றாகக் கலக்கப்பட்டு, பாளங்கள் இதில் விடப்பட்டு இரவு முழுதும் விட்டு வைக்கப்படுகின்றன.

6-ம் நாள் : பாளங்கள் காலையில் இருமுறையும் மாலையில் இருமுறையும் குழி திருப்பப்படுகின்றன.

7-ம் நாள் : } பாளங்கள் இருமுறை குழி திருப்பப்படுகின்றன.
8-ம் நாள் : }

முடிதள்ளுதலும், மறு சுண்ணாம்பிடுதலும் (காரம்) :

9-ம் நாள் : பாளங்கள் முடி தள்ளப்படுகின்றன. பின்னர் வேறொரு குழியில் தேவையான அளவு தண்ணீர் நிரப்பப்பட்டு, அதில் நனைவு எடையில் 12% தாளித்த சுண்ணாம்புப் பசையும், $\frac{1}{2}$ % காஸ்டிக் சோடாவும் கலக்கப்பட்டு, பாளங்கள் இப்புதிய சுண்ணாம்புத் தண்ணீரில் மறு சுண்ணாம்பிடப்படுகின்றன.

10-ம் நாள் : பாளங்கள் காலையில் ஒருதடவையும் மாலையில் ஒரு தடவையும் குழி திருப்பப்படுகின்றன.

11-ம் நாள் : } பாளங்கள் இரண்டு தடவைகள்

12-ம் நாள் : } குழி திருப்பப்படுகின்றன.

13-ம் நாள் : பாளங்கள் சல்லா சீவப்படுகின்றன. சல்லா எடை எடுக்கப்பட்டுக் குறித்துக் கொள்ளப்படுகிறது. பின்னர் இவை சுத்தமான தண்ணீரில் போடப்பட்டு $1\frac{1}{2}$ மணி நேரத்திற்கு விட்டு வைக்கப்படுகின்றன. பிறகு கார் வாங்கப்படுகின்றன. பிறகு ஒருமுறை தண்ணீர் மாற்றிக் கழுவப்பட்டு, தேவையான குறைந்த அளவு தண்ணீரில் சல்லா எடையில் $\frac{1}{2}$ % அமோனியம் சல்பேட் (Ammonium sulphate) கரைக்கப்பட்டு, பாளங்கள் இத்தண்ணீரில் 10 நிமிடங்கள் நன்றாகப் புரட்டப்பட்ட பின் இரவு முழுதும் இத்தண்ணீரிலேயே விட்டு வைக்கப்படுகின்றன.

14-ம் நாள் : பாளங்கள் மற்றொரு தடவை கார் வாங்கப்பட்டு, சுத்தமான தண்ணீரில் $\frac{1}{2}$ மணி நேரத்திற்கு விட்டு வைக்கப்படுகின்றன. பின்னர் சல்லா எடையில் $\frac{1}{2}$ % நாப்தலின் சல்பானிக் அமிலம் கலந்த 200% தண்ணீரில் நன்றாக அலசப்பட்டு 10 நிமிடங்களுக்கு இத்தண்ணீரிலேயே விட்டு வைக்கப்படுகின்றன. பின்னர் இவை முதல் பதனிடு குழிக்கு எடுத்துச் செல்லப்படுகின்றன.

பதனிடுதல் :

$1\frac{1}{2}$ பாகம் கருவேலம் பட்டையும் 1 பாகம் தூள் கடுக்காயும் கொண்டு பதனிடு திரவம் தயாரிக்கப்படுகிறது. இவை இரண்டு பதனிடு சாரம் இறக்கும் தொட்டிகளில் (Leach battery) போடப்பட்டு 65° வீர்யமுள்ள பதனிடு திரவம் தயாரிக்கப்படுகிறது. பின்னர் தேவையான அளவு

வாட்டில் சாரக்கட்டியை உபயோகித்து, திரவம் 80° வீர்ய முள்ளதாகச் செய்து கொள்ளப்படுகிறது.

15-ம் நாள் : சுண்ணாம்பு முழுவதும் நீக்கப்படாத இப் பாளங்கள் 6° வீர்யமுள்ளதும், 4.25 அமில வலிமை எண் (pH) உள்ளதுமான பதனிடு திரவங்கொண்ட ஒரு குழியில் போடப்பட்டு, நான்கு தடவை குழி திருப்பப்பட்டு இரவு முழுதும் இக்குழியிலேயே விட்டு வைக்கப்படுகின்றன.

16-ம் நாள் : பாளங்கள் 8° வீர்யமுள்ளதும் 4.25 அமில வலிமை எண் கொண்டதுமான பதனிடு திரவம் கொண்ட ஒரு குழிக்கு மாற்றப்பட்டு, மூன்று தடவை குழி திருப்பப்பட்டு இரவு முழுதும் இக்குழியிலேயே விட்டு வைக்கப்படுகின்றன.

17-ம் நாள் : பாளங்கள் 10° வீர்யமுள்ளதும் 4.2 அமில வலிமை எண் கொண்டதுமான பதனிடு திரவம் கொண்ட ஒரு குழிக்கு மாற்றப்பட்டு 2 தடவை குழி திருப்பப்படுகின்றன.

18-ம் நாள் : 15° வீர்யமுள்ளதும் 4.2 அமிலவலிமை எண் கொண்டதுமான பதனிடு திரவம் கொண்ட குழிக்கு மாற்றப்பட்டு 2 தடவை குழி திருப்பப்படுகின்றன.

19-ம் நாள் : 20° வீர்யமுள்ளதும் 4.2 அமில வலிமை எண் கொண்டதுமான பதனிடு திரவம் கொண்ட குழிக்கு மாற்றப்பட்டு 2 தடவை குழி திருப்பப்படுகின்றன.

20-ம் நாள் : 25° வீர்யமுள்ளதும் 4.2 அமில வலிமை எண் கொண்டதுமான பதனிடு திரவம் கொண்ட குழிக்கு மாற்றப்பட்டு 2 தடவை குழி திருப்பப்படுகின்றன.

21-ம் நாள் : 30° வீர்யமுள்ளதும் 4.2 அமில வலிமை எண் கொண்டதுமான பதனிடு திரவம் கொண்ட குழிக்கு மாற்றப்பட்டு 2 தடவை குழி திருப்பப்படுகின்றன.

குறிப்பு : பதனிடு வேலை நடைபெறும்போது முதல் குழியில் (6° வீர்யமுள்ள பதனிடு திரவம் கொண்ட குழியில்) பதனிடு வேலை முடிவுற்றதும் அதிலிருந்து $\frac{1}{8}$ பாகம் திரவம்

வெளியே விடப்படுகிறது. பிறகு 2-ம் குழியிலிருந்து (8° வீர்யம்) முதல் குழிக்கு $\frac{1}{8}$ பாகம் திரவம் விடப்படுகிறது. இவ்வாறு வீர்யம் குறைந்த குழியிலிருந்து தொடங்கி ஒவ்வொரு குழியிலிருந்தும் $\frac{1}{8}$ பாகம் திரவம் அடுத்த குழிக்கு மாற்றப்படுகிறது. நடுநடுவே இக்குழிகளிலுள்ள திரவத்தின் வீர்யத்தைச் சோதனை செய்து பார்த்து எங்கு வீர்யம் குறைகிறதோ அதைச் சரிப்படுத்த வேண்டும்.

22-ம் நாள் : 6% 'பி அண்டு சி' குரோம் சாரத்தாள், 2% நாப்தலின் சல்பானிக் அமிலம், 100° வீர்யமுள்ள 1% வாட்டில் சாரத்திரவம் ஆகிய மூன்றும் ஒன்று கலக்கப்பட்டு, பாளங்கள் மூழ்கி இருப்பதற்குத் தேவையான குறைந்த அளவு தண்ணீர் (சுமார் 100%) ஒரு பீப்பாயில் நிரப்பப்பட்டு, மேற்கூறிய கலவை பீப்பாயில் சேர்க்கப்பட்டு, பாளங்கள் பீப்பாயில் போடப்பட்டு பீப்பாய் 4 மணி நேரத்திற்கு இயக்கப்படுகிறது. இப்போது தோல்களில் குரோம் நன்றாக ஊடுருவிச் சென்றிருக்கும். தோலின் நிறமும் இதனால் பாதிக்கப்பட்டிராது. பின்னர் 65° வீர்யமுள்ள பதனிடு திரவத்தில் இரவு முழுதும் விட்டு வைக்கப்படுகின்றன.

23-ம் நாள் : பாளங்கள் 65° வீர்யமுள்ள திரவங் கொண்ட பீப்பாயுள் போடப்பட்டு பீப்பாய் 1 மணி நேரத்திற்கு இயக்கப்படுகிறது. பிறகு 80° வீர்யமுள்ள திரவம் கொண்ட பீப்பாயில் 1 மணி நேரத்திற்கும், 100° வீர்யமுள்ள திரவம் கொண்ட பீப்பாயில் 2 மணி நேரத்திற்கும் இயக்கப்படுகின்றன. (தேவையான அளவு வாட்டில் சாரம் கலந்து திரவத்தின் வீர்யம் அதிகரிக்கப்படுகிறது.) பின்னர் பாளங்கள் அதே பீப்பாயில் (100° வீர்யம்) 50° செ. கிரேடு உஷ்ண நிலையில் இரவு முழுதும் விட்டு வைக்கப்படுகின்றன.

24-ம் நாள் : காஸையில் பார்த்தால் பாளங்கள் நன்கு பதனிடப்பட்டிருப்பது தெரியும். பிறகு இவை பட்டறையாக விட்டு வைக்கப்படுகின்றன.

25-ம் நாள் : பாளங்கள் ஒரு பீப்பாயில் ஓடும் தண்ணீரில் 1½ மணி நேரத்திற்குக் கழுவப்படுகின்றன. பிறகு பீப்பாயில், சல்லா எடையில் $\frac{1}{2}$ % சோடியம் பைசல்பைட்டு (Sodium bisulphite) சேர்க்கப்பட்டு, பீப்பாய் 5 நிமிடங்களுக்கு இயக்கப்

படுகிறது. பின்னர் சல்லா எடையில் ½% ஆக் சாலிக் அமிலம் போதிய அளவு தண்ணீரில் கரைக்கப்பட்டு 1% கரைசலாக்கப்பட்டு, மெதுவாகப் பீப்பாயில் ஊற்றப்படுகிறது. ஆக் சாலிக் அமிலக் கரைசல் பீப்பாயில் சேர்க்கப்பட்டு முடிந்த பின் பீப்பாய் 15 நிமிடங்களுக்கு இயக்கப்படுகிறது. பின்னர் பாளங்கள் வெளியே எடுக்கப்பட்டு வடிவதற்காக மரக்குதிரைகளின் மேல் போடப்படுகின்றன.

பின்னர் பாளங்கள் கீழ்க்கண்டவாறு எண்ணெய் பூசப்படுகின்றன.

தேவையான பொருள்கள்

டர்க்கிரெட் ஆயில் (T. R. O.)	2½%	(சல்லா எடை)
கடலை எண்ணெய்	½%	„
மண்ணெண்ணெய் (கெரோசின்)	¼%	„
கொழுப்பு (Tallow)	¼%	„

முதலில் கொழுப்பு உருக்கப்படுகிறது. அது சூடாக இருக்கும்போதே கடலை எண்ணெயுடன் கலக்கப்படுகிறது. பிறகு இத்துடன் மண்ணெண்ணெய் (கெரோசின்) கலக்கப்படுகிறது. பின்னர் இக்கலவை முழுவதும் டர்க்கிரெட் ஆயிலுடன் ஒன்று கலக்கப்படுகிறது. இந்த எண்ணெய்க் கலவை பாளங்களின் மேனிப் பக்கத்தில் பூசப்படுகிறது. பிறகு 2% எப்சம் உப்பும், 3% திரவ குளுகோசும் (Liquid glucose) தேவையான குறைந்த அளவு தண்ணீரில் கலக்கப்பட்டு, இக்கலவை பாளங்களின் சவ்வுப் பக்கத்தில் பூசப்படுகிறது. பின்னர் பாளங்கள் உலர்வதற்காகத் தொங்க விடப்படுகின்றன.

சுருக்கம் (தாண்) தள்ளுதல் :

26-ம் நாள் : பாளங்கள் இயந்திரத்தில் நன்றாகச் சுருக்கம் (தாண்) தள்ளப்படுகின்றன. பிறகு சல்லா எடையில் சுமார் ½% கடலை எண்ணெய் ஒரே சீராகப் பாளங்களின் மேனிப் பக்கத்தில் பூசப்பட்டு பாளங்கள் உலர வைக்கப்படுகின்றன.

ஒப்பனை :

27-ம் நாள் : பாளங்கள் பின்வரும் கலவை பூசப்பட்டு ஒப்பனை செய்யப்படுகின்றன.

கலவை தயாரிக்கும் முறை

1½ பாகம் போரக்சை (Borax) உபயோகித்து 6 பாகம் வெந்நீரில் 1 பாகம் கேசின் கரைக்கப்படுகிறது. இத்துடன் 1½ பாகம் பார் சோப் சேர்க்கப்பட்டபின் 1½ பாகம் போரிக் அமிலம் இத்துடன் கலக்கப்படுகிறது. பிறகு ½ பாகம் ஆளினிதை குறைந்த அளவு வெந்நீரில் போட்டுவேக வைக்கப்பட்டு பிசின் தயாரிக்கப்பட்டு இப்பிசின் மேற் கூறிய கலவையுடன் சேர்க்கப்படுகிறது. கலவை மொத்தம் 10 பாகம் ஆகும் அளவு தண்ணீர் சேர்க்கப்பட்டு இக் கலவை பாளங்களின் மேனிப் பக்கத்தில் பூசப்படுகிறது. பின்னர் பாளங்கள் உலர வைக்கப்பட்டு, இயந்திர உருளை யால் முதலில் லேசான அழுத்தத்திலும் பின்னர் அதிக அழுத்தத்திலும் அழுத்தப்படுகின்றன (rolled and rerolled). இதன் பின் பாளங்கள் நிறுக்கப்படுகின்றன. இம் முறையில் சல்லா எடையில் 55-56% (காய்ந்த கச்சாத் தோல்களின் எடையில் 170%) ஒப்பனைத் தோல் கிடைத்தது.

செய்திக் கதிர்

தோல் ரசாயன ஆராய்ச்சியாளர்களின்
சொசைடிகளது அகில உலக யூனியன்
(International union of leather chemists societies)

வரலாற்றுச் சுருக்கம்

அகில உலகக் கூட்டுறவில் தலைசிறந்து விளங்கும் தொழில் தோல் தொழிலாகும். 1897-ம் ஆண்டில் 'இண்டர்நேஷனல் அசோசியேஷன் ஆப் லெதர் ட்ரேடர்ஸ் கெமிஸ்ட்ஸ்' என்ற நிறுவனம் ஒன்று அமைக்கப்பட்டது. இதன் முக்கிய நோக்கம் ஒரேதரமான, ஒன்றுபட்ட ஆராய்ச்சி, தோல் தொழிலில் இருக்க வேண்டும் என்பதேயாகும். இந்நிறுவனம் சொந்தமாக 'காலஜியம்' என்ற ஒரு பத்திரிகையும் நடந்தி வந்தது. இதில் இங்கிலாந்து, ஜெர்மனி, ஸ்காண்டிநேவியா, பிரான்ஸ், பெல்ஜியம், இத்தாலி, ஆஸ்திரியா—ஹங்கேரி, ஸ்பெயின், ஐக்கிய அமெரிக்கா முதலிய நாடுகளுக்குத் தனித்தனிப் பிரிவு அளிக்கப்பட்டு வந்தது. 1914-ம் ஆண்டுக்குப் பின்னர் தோன்றிய உலக நிலை இந்தக் கூட்டுறவை நிலைபெருமல் செய்து விட்டது.

இதன் பிறகு 1917-ம் ஆண்டு 'சொசைடி ஆப் லெதர் ட்ரேடர்ஸ் கெமிஸ்ட்ஸ் (S. L. T. C.)' என்ற நிறுவனம் அமைக்கப்பட்டது. இதுவே 1925-ல் அகில உலக சொசைடியாக (I. S. L. T. C.) மாறியது. 1903-ம் ஆண்டு நிறுவப்பட்ட 'அமெரிக்கன் லெதர் கெமிஸ்ட்ஸ் அசோசியேஷனும்' 'காலஜியம்' என்ற பத்திரிகையும் இப்போதும் இயங்கி வந்தன. இரண்டாம் உலக யுத்தத்திற்குப் பிறகு இந்த அகில உலக சொசைடியின் பிரிவுகள் ஒரு பெடரேஷனுக்கு உட்பட்ட சுய ஆட்சியுள்ள சொசைடிகளாக இயங்கினால் இன்னும் பயன் தரும் அபிவிருத்தி ஏற்படும் என்று கருதப் பட்டது.

1947-ம் ஆண்டு நவம்பர் மாதம் நடைபெற்ற ஐ. எஸ். எல். டி. சி.யின் நிர்வாகக் குழுவின் கூட்டம் சரித்திர முக்கியத்துவம் வாய்ந்தது. இக்கூட்டத்தில் டிசம்பர் 31-ம் தேதியன்று ஐ. எஸ். எல். டி. சி. கலைக்கப்பட்டு, 1948 ஜனவரி 1-ம் தேதி முதல், ஆஸ்திரேலியா, இங்கிலாந்து, இந்தியா, தென் ஆப்பிரிக்கா முதலிய நாடுகளின் பிரிவு

களும், பொதுப் பிரிவுகளும் சேர்ந்து 'சொசைடி ஆப் லெதர் ட்ரேடர்ஸ் கெமிஸ்ட்ஸ்' என்ற நிறுவனத்தைத் துவங்குவது என்றும் முடிவு செய்யப்பட்டது.

'இண்டர்நேஷனல் யூனியன் ஆப் லெதர் கெமிஸ்ட்ஸ் சொசைடி'க்கு ஆன சட்டதிட்டங்கள் வரையப்பட்டு நிர்வாகக் குழுவின் தேர்ந்தெடுக்கப்பட்டனர். 1949-ம் ஆண்டுக்கான சந்தாத் தொகையை அமெரிக்கா, பெல்ஜியம், இங்கிலாந்து, ஹாலந்து, பிரான்ஸ், இத்தாலி, ஸ்விட்சர்லாந்து முதலிய நாடுகளின் சொசைடிகள் செலுத்தின.

இந்த யூனியனின் முதற் கூட்டம் 1949-ம் ஆண்டு செப்டம்பர் மாதம் பாரிஸ் நகரத்தில் நடைபெற்றது. பேராசிரியர் டாக்டர் சம்பார்டு அவர்கள் தலைமை வகித்தார். இக்கூட்டத்தில் அமெரிக்கா, பெல்ஜியம், இங்கிலாந்து ஆகிய நாடுகளின் பிரதிநிதிகள் கலந்து கொண்டார்கள். செக்கோஸ்லாவாகியா, நார்டிக் தேசங்கள் ஆகியவற்றின் சொசைடிகள் யூனியனில் சேர்த்துக் கொள்ளப்பட்டன. பிறகு ஸ்பெயின் தேசத்தின் சொசைடியும் யூனியனின் அங்கத்தினராகத் தேர்ந்தெடுக்கப்பட்டது.

இந்த யூனியனின் 2-வது கூட்டம் 1951-ம் ஆண்டு செப்டம்பர் மாதம் ஜே. ஆர். ப்ளாக்கே அவர்களின் தலைமையில் லண்டன் மாநகரத்தில் கூடியது. இக்கூட்டத்தில் ஜெர்மனி தேசத்தின் சொசைடி அங்கத்தினராகத் தேர்ந்தெடுக்கப்பட்டது.

இதன் பிறகு 1953-ம் ஆண்டில் பார்சிலோனாவிலும், 1955-ல் ஸ்டாக்ஹோம் நகரத்திலும், 1957-ம் ஆண்டு ரோம் நகரத்திலும், 1959-ம் ஆண்டு மியூனிச் நகரத்திலும் கூட்டங்கள் நடைபெற்றன.

இப்போது இந்த யூனியனில் அமெரிக்கா, ஆஸ்திரியா, அர்ஜென்டினா, பெல்ஜியம், இங்கிலாந்து, செக்கோஸ்லாவாகியா, ஹாலண்டு, ஐக்கிய அரபுக் குடியரசு (ஈஜிப்ட்), பிரான்ஸ், ஜெர்மனி, ஹங்கேரி, இந்தியா, இத்தாலி, நார்டிக், போலந்து, ஸ்பெயின், ஸ்விட்சர்லாந்து, துருக்கி, யூகோஸ்லாவியா ஆகிய 19 நாடுகளின் சொசைடிகள் அங்கம் வகிக்கின்றன.

இந்தியக் கச்சாத் தோல் ஏற்றுமதி நிலை

(1958 முதல் 1960 முடிய 3 ஆண்டுகளுக்கான மதிப்பீடு)

ஆடு, மாடு, முதலிய மிருகங்களின் தோல்கள் பொதுவாக எல்லா நாடுகளிலும் கிடைப்பினும், உணவுக்காக

ஆடு, மாடுகளைக் கொல்வது இத்தோல்கள் கிடைக்கும் அளவைச் சில சமயங்களில் தீர்மானிக்கிறது என்று கூறலாம். சாதாரணமாக விற்பனைக்கு அதிகமாக வருபவை மாடு, வெள்ளாடு, செம்மறியாடு ஆகியவற்றின் தோல்களே யாகும். அர்ஜென்டினாவும், அமெரிக்காவும் தோல் ஏற்றுமதியில் முதலிடம் வகிக்கின்றன.

1958-ம் ஆண்டு, தோல் ஏற்றுமதி செய்யும் நாடுகளிலிருந்து ஏற்றுமதி செய்யப்பட்ட மொத்தத் தோல்களில் 25 சதவீதம் அர்ஜென்டினாவிலிருந்தும், 23 சதவீதம் அமெரிக்காவிலிருந்தும் ஏற்றுமதி செய்யப்பட்டன. இதில் காமன்வெல்த் நாடுகளின் பங்கு 31 சதவீதம் ஆகும். காமன் வெல்த் நாடுகளில் ஆஸ்திரேலியா முதலாவதாகவும் நியூசிலாந்து இரண்டாவதாகவும் இடம் பெற்றன. தென் ஆப்பிரிக்க யூனியன், கனடா, இந்தியா, கிழக்கு ஆப்ரிக்கா, பாகிஸ்தான் ஆகிய நாடுகளும் நிறைய ஏற்றுமதி செய்யினும் இந்நாடுகளின் மொத்த ஏற்றுமதி 'ஐரோப்பிய எகனாமிக் கம்யூனிடி' நாடுகளின் (இத்தாலி தவிர) ஏற்றுமதியை விடக் குறைவேயாகும். 'ஐரோப்பிய எகனாமிக் கம்யூனிடி' நாடுகள் பெருத்த அளவில் தோல் இறக்குமதி செய்பவையாயும் விளங்குகின்றன. 1958-ல் உலக ஏற்றுமதியில் 48 சதவீதம் இந்நாடுகளில் இறக்குமதி செய்யப்பட்டது. இந்நாடுகள் முக்கியமாக மாடு, செம்மறியாடு, செம்மறியாட்டுக் குட்டி ஆகியவற்றின் தோல்களையே இறக்குமதி செய்கின்றன.

1951-ம் ஆண்டு இந்தியாவில் 15.9 மிலியன் பசு மாட்டுத் தோல்களும், 5.2 மிலியன் எருமைத் தோல்களும் 21.8 மிலியன் வெள்ளாட்டுத் தோல்களும், 15.5 மிலியன் செம்மறியாட்டுத் தோல்களும் கிடைத்தன. வெள்ளாட்டுத் தோல்கள்தான் இந்தியாவிலிருந்து முக்கியமாக ஏற்றுமதிக்குக் கிடைக்கின்றன என்பது இதிலிருந்து புலனாகும்.

1953-ம் ஆண்டு உலக நாடுகளின் மொத்தத் தோல் ஏற்றுமதியில் இந்தியாவின் பங்கு 1.5 ஆக இருந்தது. உரோமத்துடன் அணிந்து கொள்ளக்கூடிய தோல்களைத் தவிரப் பிறதோல்களின் ஏற்றுமதி 1959-ம் ஆண்டு முந்தைய ஆண்டைவிட 9 சதவீதம் அதிகமாகியது, 1960-ம் ஆண்டு இது 1959-ம் ஆண்டைவிட 6 சதவீதம் குறைந்தது.

1958 முதல் 60 முடிய மூன்று ஆண்டுகளுக்கான ஏற்றுமதி அளவுகள் பின்வருமாறு :

ஆண்டு	ஏற்றுமதி (கிலோகிராம்)	மதிப்பு (ரூபாயில்)
1958	12.0 மிலியன்	7.2 கோடி
1959	13.1 „	10.7 „
1960	12.2 „	10.1 „

மேலே கொடுக்கப்பட்ட விவரங்களிலிருந்து 1960-ம் ஆண்டு ஏற்றுமதி எவ்வளவு குறைந்தது என்பது புலனாகும்.

இந்தியாவிலிருந்து தோல்களை வாங்கும் நாடுகளில் முதலிடம் பெறுவது ரஷ்யாவாகும். இந்நாட்டுக்கான ஏற்றுமதி அளவு பின்வருமாறு.

ஆண்டு	ஏற்றுமதி (கிலோ கிராம்)	மதிப்பு (ரூபாயில்)
1958	3.7 மிலியன்	2.7 கோடி
1959	6.1 „	5.5 „
1960	6.3 „	5.2 „

இந்தியத் தோல் ஏற்றுமதியில் இரண்டாவது இடம் வசிப்பது ஐக்கிய அமெரிக்காவாகும். இந்நாட்டிற்கான ஏற்றுமதி அளவு பின்வருமாறு :

ஆண்டு	ஏற்றுமதி (கிலோ கிராம்)	மதிப்பு (ரூபாயில்)
1958	5.0 மிலியன்	2.17 கோடி
1959	3.6 „	2.27 „
1960	2.9 „	1.94 „

இதிலிருந்து அமெரிக்காவுக்கான ஏற்றுமதியின் அளவு குறைந்து வருவது கண்கூடு. 1959-ம் ஆண்டு இந்தியாவிலிருந்து அமெரிக்காவுக்கு ஏற்றுமதி செய்யப்பட்ட தோல்கள், அவ்வாண்டு அந்நாட்டின் தோல் இறக்குமதியில் 8 சதவீதம் ஆகும்.

இனி செக்கோஸ்லாவாகியா, மேற்கு ஜெர்மனி, இத்தாலி, இங்கிலாந்து முதலிய நாடுகளுக்கு ஏற்றுமதி அளவுகளைக் கவனிப்போம்.

நாடு	ஆண்டு	ஏற்றுமதி (கிலோ கிராம்)	மதிப்பு (ரூபாயில்)
செக்கோஸ்லாவாகியா	1958	457.0 ஆயிரம்	43.0 லட்சம்
	1959	559.0	56.0
	1960	612.0	82.0
மேற்கு ஜெர்மனி	1958	609.0	50.0
	1959	663.8	62.5
	1960	637.25	57.5
இத்தாலி	1958	711.0	40.0
	1959	762.0	44.0
	1960	423.0	28.0
இங்கிலாந்து	1958	813.0	54.0
	1959	355.0	38.0
	1960	329.0	24.0

மேற்காணும் விவரங்களிலிருந்து செக்கோஸ்லாவாகியாவுக்கான ஏற்றுமதி படிப்படியாக அதிகரித்து வருவதும் தெரியவரும். மேற்கு ஜெர்மனிக்குள்ளான ஏற்றுமதி 1959-ம் ஆண்டு முந்தைய ஆண்டைவிட அதிகரிப்பினும், 1960-ம் ஆண்டு ஏற்றுமதி 4 சதவீதமும், மொத்த மதிப்பு 8 சதவீதமும் குறைந்து விட்டது புலனாகும். 1959-ம் ஆண்டுக்கான மேற்கு ஜெர்மனியின் மொத்த இறக்குமதியில் இந்தியாவின் பங்கு 0.4 சதவீதத்திற்குச் சமமானதாக விளங்கியது. அந்நாட்டு இறக்குமதியின் மொத்த விலையில் இது 0.9 சதவீதமாகும். இத்தாலி நாட்டுக்கான ஏற்றுமதியும் 1959-ம் ஆண்டு முந்தைய ஆண்டைவிட அதிகரிப்பினும் 1960-ம் ஆண்டு ஏறத்தாழ சரிபாதியாகக் குறைந்து விட்டது. இங்கிலாந்துக்கான ஏற்றுமதி 1959-ம் ஆண்டில் முந்தைய ஆண்டைவிடச் சரிபாதிக்கும் மேலாகக் குறைந்து விட்டதும், 1960-ல் இது மேலும் குறைந்திருப்பதும் புலனாகும்.

குறுகிய காலத்தில் நனைவு வேலை

புதியதோர் ரசாயனப் பொருளின் உபயோகம்

சிகாகோவைச் சேர்ந்த 'சான் போர்டு கெமிகல் கம் பெனியார்' அண்மையில் 'ஹைடு-டெர்ஜெண்ட்' (Hide-Tergent) என்ற ஓர் ரசாயனப் பொருளை விற்பனை செய்து

வருகின்றனர். இது ஒரு 'நனைவு ஊக்கி' யாகும். இதை உபயோகிப்பதன் மூலம் ஒரு நாளில் ஒரே பீப்பாய் அல்லது மரத்துடுப்பு இயந்திரத்தில் இரண்டு கட்டு (Packs) தோல் களை நனைவு வேலை செய்யலாம் என மேற்படி கம்பெனியின் அதிகாரி ஒருவர் எடுத்துக் கூறியுள்ளார்.

குறைவாக நுரைப்பதும், அதிகமாக ஊடுருவிச் செல்லும் சக்தி வாய்ந்ததுமான இந்த 'நனைவு ஊக்கியை' உபயோகிப்பதன் மூலம் நனைவு வேலையின் நேரம் 2-3 மணி யாகக் குறைகிறது. தோல்கள் ஒன்றுபோல் சல்லா சீவப் பட்டு, முடி நீக்குவதற்கும், சுண்ணாம்பு வேலைக்கும் தயார் செய்யப்படுகின்றன. இப்புதிய முறையின் மூலம் தோல்களை இரவு முழுதும் தண்ணீரில் நனைத்து வைக்கும் முறை தவிர்க்கப்படுகிறது.

நனைவு வேலை மிகக் குறுகிய காலத்தில் செய்யப்படுவதால் அதிக அளவு பீப்பாய்களும், மரத்துடுப்பு இயந்திரங் களும் சுண்ணாம்பு வேலை, தணிக்கும் வேலை (Bating) ஆகியவற்றிற்குக் கிடைக்கின்றன. இம்முறையில் பதனிடப் பட்ட தோல்கள் மென்மையான தணிந்த மேனி (Lower grain pattern) கொண்டவையாயும் தடித்த விலாப்புறம், வயிற்றுப்புறம் கொண்டவையாயும் இருந்தன.

நனைவு உஷ்ண நிலை 75°-85° பாரன் ஹீட்டில், 1000 ராத்தல் தண்ணீருக்கு 2½ ராத்தல் ஹைடு-டெர்ஜெண்ட்' உபயோகித்தால் நல்ல பலன் கிடைக்கிறது என்று இக் கம்பெனி கண்டுள்ளது.

வில்லியம் ஆமெர் கம்பெனி அளிக்கும் புதுமாதிரித் தோல்

தோல் நாகரிக வளர்ச்சியின் மற்றொரு படியாகப் புதிய பாணியில் ஒரு தோல் வில்லியம் ஆமெர் கம்பெனியாரால் தயாரிக்கப்பட்டுள்ளது. இது முழுதும் குரோம் பதனிடப் பட்டதாகும். இவைகளை முடி நீக்கும் போது முன்பே குறிப் பிடப்பட்ட இடங்களில் மட்டும் முடி நீக்கப்படுவதன் மூலம் அழகிய டிசைன்கள் பெறப்படுகின்றன. பின்னர் தனிப் பட்டதோர் வேலைக்குப் பிறகு வழக்கமான முறையில் குரோம் பதனிடப்படுகின்றன. குரோம் பதனிடும்போது தோலுக்கு நிறம் ஊட்டப்படுகிறது.

இத்தோல் தயாரிக்கும் உரிமை வில்லியம் ஆமெர் கம் பெனியின் தொழில் நுணுக்க டைரக்டர் டாக்டர் ப்ராங்க்.

டபிள்யூ. பானபிண்ட்டோ அவர்களுக்கு அளிக்கப்பட்டது. அவர் இவ்வுரிமையை ஆமெர் கம்பெனிக்கே அளித்துள்ளார்.

வில்லியம் ஆமெர் கம்பெனியார் 'கிங்க் கிட்', 'கிங்க் கங்காரு' போன்ற தோல்கள் தயாரிப்பதில் சிறந்து விளங்குகின்றனர். மேற்கூறிய உரிமை பதிவு செய்யப்பட்ட முறை வெள்ளாட்டுத் தோல், கங்காருத் தோல் ஆகியவைகளைத் தவிர கன்றுகள், பசு, குதிரை, செம்மறியாடு ஆகிய மிருகங்கள் எல்லாவற்றின் தோலுக்குமாக வகுக்கப்பட்டுள்ளது. அதிக உரோமம் உள்ள மிருகங்களான 'சேபிள்' (Sable), 'எர்மைன்' (Ermine), 'பெர்சியன் ஆடு' ஆகியவற்றின் தோலும் இந்த உரிமை முறையில் அடங்கும். இம்முறையில் உற்பத்தி செய்யப்படும் தோல்கள் 'பர்பெல்லோ' (Furbello) என்று வாணிக அடையாளப் பொறிப்புக் (Trademarks) கொண்டவையாகும். இத்தோல்கள் காலணிகள், கைப்பைகள், பெட்டுகள், தொப்பிகள் ஆகியவை தயாரிக்க, பல விதமான நிறச் சேர்க்கைகளுடன் கிடைக்கின்றன. உதாரணமாக மஞ்சள், பச்சை, நீலம், கருப்பு ஆகிய நிறத்தில் இருக்கும் தோல்கள் கருப்பு நிற உரோமத்தோடும்; கருப்பு, பழுப்பு, சிவப்பு முதலிய நிறத்தோல்கள் வெண்மையான உரோமத்துடனும் தயாரிக்கப்படுகின்றன.

விளம்பரங்கள் செய்வதற்கு இத்தோல்கள் மிகவும் ஏற்றதாக விளங்குகின்றன. தேவையான விளம்பர விஷயங்களை முதலிலேயே தோலின் மீது பொறித்து விளம்பரத் தோல் தயாரிக்கப்படுகிறது.

உலகக் கால்நடை மதிப்பீடு

1961-ம் ஆண்டில் உலகத்தில் மொத்தம் 101 கோடியே 10 லட்சம் கால்நடைகள் இருப்பதாக மதிப்பிடப்பட்டுள்ளது. இது முந்தைய ஆண்டைவிட 50 லட்சம் அதிகமாகும். 1951-55-ம் ஆண்டுகளுக்கான சராசரியை விட இது 10 கோடி அதிகமாகும். எட்டு ஆண்டுகளில் இது 11 சதவீதம் அதிகரித்திருக்கிறது.

உலகில் கால்நடைகளின் எண்ணிக்கை பொதுவாக அதிகமாகி இருப்பினும், வட அமெரிக்காவிலும், ஆசியாவிலும் இது 1 சதவீதம் குறைந்திருக்கிறது. வட அமெரிக்காவில் இது குறைந்ததற்குக் காரணம் க்யூபாவில் பண்ணைகளின் அமைப்பில் ஏற்பட்ட மாறுதல்களின் மூலம் கால்நடைகளின் எண்ணிக்கை குறைந்ததே காரணம் என்று கருதப்படுகிறது.

தென் அமெரிக்காவிலும், ஓஷியானாவிலும் 3 சதவீதமும், கிழக்கு-மேற்கு ஐரோப்பா, ரஷ்யா முதலிய நாடுகளில் 2 சதவீதமும், ஆப்பிரிக்காவில் 1 சதவீதமும் இது அதிகமாயிற்று.

தென் அமெரிக்காவில், முக்கியமாக அர்ஜென்டினாவில் கால்நடைகள் எண்ணிக்கை மிகவும் அதிகமாகி வருகிறது. ஐக்கிய அமெரிக்க நாடுகள், இந்தியா, ரஷ்யா, பிரேசில், கம்யூனிஸ்ட் சைனா ஆகிய நாடுகளில் 6 கோடி அல்லது அதற்கு அதிகமான கால்நடைகள் உள்ளன. அர்ஜென்டினா 4 கோடியே 60 லட்சம் கால்நடைகளுடன் 6-வது இடம் பெறுகிறது. பாகிஸ்தான், மெக்ஸிகோ, எதியோப்பியா, பிரான்ஸ் ஆகிய நாடுகளில் 1 கோடியே 90 லட்சம் முதல் 3 கோடி வரை கால்நடைகள் உள்ளன.

மேற்கு ஐரோப்பாவில் அயர்லாந்து தேசத்தில் பல ஆண்டுகளாக அதிகமாகி வந்த கால்நடைகளின் எண்ணிக்கை 1960-ல் கொஞ்சம் குறைந்தது. ஷயரோகத்தை ஒழிப்பதற்கென மேற்கொள்ளப்பட்ட நடவடிக்கைகளும், அதிக அளவு இறைச்சியும், கால்நடைகளும் ஏற்றுமதி செய்யப்பட்டதுவுமே இதற்குக் காரணம் ஆகும்.

'ஸ்ப்ரூஸ்' (Spruce) மரப்பட்டையிலிருந்து பதனிடு சாரக்கட்டி (Tanning extract) தயாரித்தல்

'ஸ்ப்ரூஸ்' என்பது பைன் வகையைச் சேர்ந்த ஒரு மரமாகும். இது கானடாவில் அதிகம் காணப்படுகிறது. கானடாவில் காகிதக் கூழ், காகிதம் ஆகியவை தயாரிப்பதற்கு உபயோகப்பட்டுவரும் இம்மரத்தின் பட்டை, அநேகமாக எரிபொருளாக உபயோகப்படுத்தப்படுகிறது. ஆனால் வருங்காலத்தில் இது பதனிடு திரவம் அல்லது சாரக்கட்டி தயாரிக்க உபயோகிக்கப்படலாம் என்பதற்கு வேண்டிய ஆதாரங்கள் கிட்டியுள்ளன.

டாரன்டோவிலுள்ள 'ஒன்டாரியோ ஆராய்ச்சி நிறுவனத்தில்' மேற்கொள்ளப்பட்டுவரும் ஆராய்ச்சிகளின் மூலம் இம்மரப்பட்டையிலிருந்து தயாரிக்கப்படும் பதனிடு சாரம், 'வாட்டில்', 'க்யுபராச்சோ' முதலிய பதனிடு சாரங்களுக்கு பதிலாகவோ, அல்லது இவற்றுடன் கூட்டாகவோ உபயோகப்படுத்தப்படுவதன் மூலம் முன்னிலை நல்ல தோல் தயாரிக்கலாம் என்பது எடுத்துக் காட்டப்பட்டுள்ளது.

இம்மரப்பட்டையிலிருந்து தயாரிக்கப்படும் பதனிடு சாரத்தை உபயோகித்துத் தயாரிக்கப்படும் தோலை, தோல் பதனிடுவோர் ஆராய்ந்து பார்த்து, இத்தோல், வழக்கமான பதனிடு பொருள்களை உபயோகித்துப் பதனிடப்பட்ட தோல்களை விடச் சிறந்தது என்று கருத்துத் தெரிவித்துள்ளனர்.

தற்போது இப்பட்டையின் பதனிடு சாரக்கட்டியை உபயோகித்துப் பதனிடு வேலை செய்வதில் இவ்வாராய்ச்சி நிறுவனம் ஈடுபட்டுள்ளது. இதன் மூலம் தற்போது பதனிடுவதற்கு ஆகும் மொத்த காலத்தில் 1/10 பாகத்திற்குள் பதனிடு வேலை முடிவடைந்துவிடும் என்று கூறப்படுகிறது. அதாவது பதனிடுங்காலம் 10 நாட்களானால் இப்புதிய சாரத்தை உபயோகித்துப் பதனிடுவதன் மூலம் வேலை 1 நாளில் முடிந்துவிடும். மேலும் பதனிடு பொருள் வீணாவதும் முற்றிலும் தடுக்கப்படுகிறது. இத்துடன் பதனிடுவோருக்கும், மற்றையோருக்கும் ஒரு பிரச்சினையாக இருந்துவரும் பதனிடு நிலையக் கழிவுத் தண்ணீரும் கணிசமான அளவு குறைக்கப்படுகிறது.

இப்புதிய பதனிடு பொருள் கானடாவில் இறக்குமதி செய்யப்படும் மற்ற பதனிடு பொருள்களின் விலைக்கு ஈடாக விற்கப்படுமாதலால், முற்றிலும் புதியதொரு தொழில் அங்கு நிறுவப்படுவதற்கு இது காரணமாக அமையலாம். 1 டன் 'ஸ்ப்ரூஸ்' பட்டையிலிருந்து 500 ராத்தல் சாரக்கட்டி தயாரிக்கலாம் என்று மதிப்பிடப்பட்டிருக்கிறது.

வாட்டில் சாரக்கட்டியிலிருந்து 'வார்னிஷ்' தயாரித்தல்

தென் ஆப்பிரிக்காவில் டர்பனிலுள்ள பெயின்ட் தொழில் ஆராய்ச்சி நிலையம், வாட்டில் சாரக்கட்டியிலிருந்து உயர்ந்த ரகத்தைச் சார்ந்த வார்னிஷ் ஒன்றைத் தயாரித்துள்ளது. இதற்கான பரிசோதனைகள் முடிவடைந்து வருகின்றன.

இம்முறை 3½ ஆண்டுகள் ஆராய்ச்சிக்குப் பிறகு கண்டு பிடிக்கப்பட்டுள்ளது. வாட்டில் சாரக்கட்டி, பட்டை ஆகிய வற்றிக்கு இன்னும் அதிகத் தேவை ஏற்படுத்துவதற்கென வாட்டில் பயிரிடுவோரும், சாரம் தயாரிப்பவர்களும் எடுத்துக் கொண்ட முயற்சியின் காரணமாகவே இந்த ஆராய்ச்சி மேற்கொள்ளப்பட்டது. 1959-ம் ஆண்டு 17.3 மிலியன் டாலர் வருமானம் அளித்த இத்தொழில் 1960-ல் 11.2 மிலியன் டாலர்தான் அளித்தது. இதற்குக் காரணம் அர்ஜென்டினாவிலிருந்து 'க்யூபராச்சோ' என்ற சாரக்கட்டி அதிகமாக வாங்கப்பட்டதும், தோலின் தேவை குறைந்ததுமேயாகும்.

இந்த வார்னிஷ் மற்ற வார்னிஷ்களுக்கு ஈடு கொடுக்கக் கூடிய விலையில் விற்கப்படலாம் என்று கருதப்படுகிறது. ஆராய்ச்சிகளின் பலன்கள் சாதகமாயிருந்தால் இவ் வார்னிஷ் தயாரிக்கும் முறை தென் ஆப்பிரிக்காவில் பெயின்ட் தயாரிக்கும் அனைவருக்கும் இலவசமாக வழங்கப்படும் ஆனால் இதற்கு தென் ஆப்ரிக்க வாட்டில்தான் உபயோகப்படுத்தப்பட வேண்டும்.

வாட்டில் பட்டையிலிருந்து நுரைபிளாஸ்டிக்குகள் (Foam Plastics) தயாரிப்பதற்கும், தண்ணீரிலுள்ள அழுக்குப் பொருள்களை நீரின் அடியில் தங்க வைத்துத் தண்ணீரைச் சுத்தமாக்கும் ரசாயனப் பொருள்களை உற்பத்தி செய்வதற்கும் ஆன ஆராய்ச்சிகள் மேற்கொள்ளப்படுவதற்கென்று பிரிட்டனிலுள்ள ஆராய்ச்சிக் கூடங்களுக்கு மான்யம் அளிக்கப்பட்டுள்ளது.

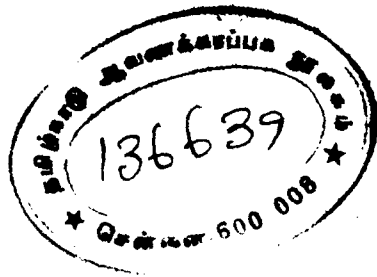
நிலையச் செய்திகள்

இந்நிலைய டைரக்டர் டாக்டர். ஓய். நாயுடம்மா அவர்கள் 13-11-61 முதல் 25-11-61 முடிய, மத்தியப் பிரதேசத்திலுள்ள பதனிடு நிலையங்களைப் பார்வையிட்டு, அவற்றின் அபிவிருத்தி பற்றி நேரில் கண்டு வந்தார்.

பிரபல விஞ்ஞான எழுத்தாளரான 'ரிச்சி கால்டரும்', அவருடைய மகன் 'நைஜல் கால்டரும்' இந்நிலையத்திற்கு விஜயம் செய்து 23-11-61, 27-11-61-ம் தேதிகளில் சொற்பொழிவாற்றினர்.

கேம்பிரிட்ஜ் 'லோ டெம்பரேச்சர் ரிசர்ச் ஸ்டேஷனின்' டைரக்டர் டாக்டர் இ. சி. பேட்ஸ்மித் அவர்கள் 27-11-61 அன்று இந்நிலையத்திற்கு விஜயம் செய்து சொற்பொழிவாற்றினார்.

சிகாகோவிலுள்ள 'ஏர்கஸ் வானிலை ஆராய்ச்சி நிலையத்தின்' 'பேராசிரியர் டாக்டர். எஸ். சந்திரசேகரன்' அவர்கள் 10-11-61 அன்று இந்நிலையத்திற்கு விஜயம் செய்தார்.



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தமிழ்நாடு ஆவணக்காப்பக நூலகம்,
எழும்பூர், சென்னை-600 008,

தவணைத்தாள்.

சே. எண் :

ப. எண் :

புழங்கிய நாள். (1)	திரும்பிய நாள். (2)	வழங்கிய நாள். (1)	திரும்பிய நாள். (2)

சீ. 259A-6-1,00,000-30-1-24.

சுயம், மாவட்டம், மாவட்டம்