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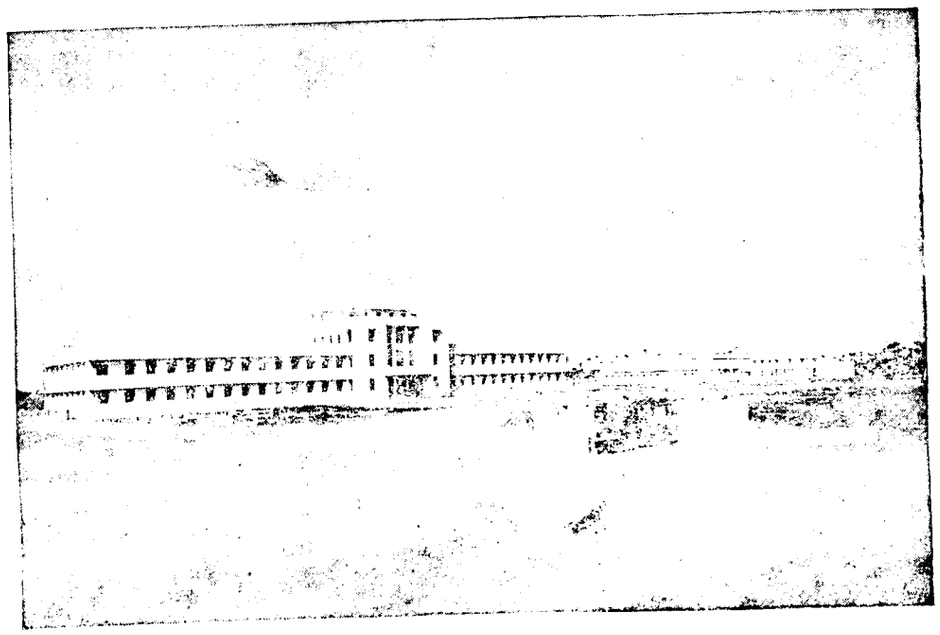

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CONTENTS

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VEGETABLE TANNINS — Pt. I. MYROBALAN TREE

BY

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Central Leather Research Institute, Madras-20

(*Received on 24th Sept.* 1958)

SUMMARY

Samples of the different parts of Myrobalan tree were collected fresh from a single myrobalan tree. Acetone extracts were prepared from all these various parts and these tannin extracts analysed for their tan, non-tan, acid and salts contents. Chromatographic studies also have been carried out with these extracts. The results obtained are discussed in the light of their possible significance in the biogenesis of the tannins.

A survey of literature[1, 2] indicates vegetable tanning extracts to be very complex materials, very little being known about their chemistry, biogenesis and function in plants. The effect of soil, climatic conditions and other factors on the formation and accumulation of tannin in a tree is also not well-understood.

In the lower plants tannins occur in very small quantities whereas in some higher families they accumulate in abundance. While they are distributed in the various parts of a tree the amounts present in the corresponding tissues vary from species to species.

The sources of vegetable tannins are pods, fruits, barks, woods, roots and leaves. Commercially these are obtained and used in the dried form. Tannins are known to be effected by factors such as enzymes, temperature, conditions of drying, moisture, etc., and the nature of the tannin as it exists in the plant and that of the commercially obtained extract have to be compared to obtain a clear picture of the effect of these factors. Any particular tannin extract

is known to be not a single substance but a heterogeneous group of substances, the constitution and chemistry of which are little known. Adequate knowledge is not available due to lack of suitable analytical techniques. Degradation and solvent fractionation methods, as also physico-chemical studies, instrumental and chromatographic investigations have been able to establish so far that tannins are mixtures of polyphenolic or related substances.

It is thus, obvious that for a better understanding of this complex subject a comprehensive study co-ordinating the various aspects, for example, botany, chemistry, organic and physical chemistries would be invaluable. A single tree of known life history should be chosen and samples of the various parts of this tree should be collected taking care to avoid further chemical changes due to drying, enzymes, etc. While the fractionation, isolation and purification of the tannin components could be achieved by application of known techniques, determination of the constitution and tanning ability of the individual components may then be determined by application of newer tools and techniques. Such a comprehensive study has been initiated in this Institute on three important tanstuffs—myrobalan, divi-divi and babul. The preliminary results obtained with Myrobalan are reported in Parts I and II of the present series.

Terminalia Chebula Retz (Myrobalan) tree is found all over India, in high level rocky Himalayas and hills of Deccan and is a valuable source of tanning material. Myrobalan fruits are used not only for tanning, but also in medicine and as a dye. Main sources for Myrobalan are Bhimlipatam, Jubbulpore, and Salem of which the Salem variety is said to be the best. Extensive work has been conducted on the use of myrobalans in tanning, and on the constitution of myrobalan tannins.[3-8] However, little information is available about the tannins in the various parts of the myrobalan tree, or in fresh fruits. Hathway[9] suggested that some of the substances detected in dried plant material, might not

occur free in the fresh ripe fruits, but could have arisen due to the rapid chemical changes involved during drying. Very little knowledge is available about the presence of tannins and such other constituents, that are present, in different parts of the myrobalan tree. Knowledge about nature and mode of formation of tannins, and their occurrence in different parts of the tree may possibly throw some light on the biosynthesis of some of these plant constituents; hence preliminary investigations have been conducted on the different parts of a myrobalan tree.

The place chosen for collection of the samples was a forest region, near Yercaud, about twenty miles from Salem (Madras), the variety available here being famous for its superior quality in producing light leathers. Various samples viz., roots, heartwood, sapwood, leaves and fresh nuts were collected from a single tree about fifty years old, with a view to follow up the investigations subsequently as well. Immediately after collection, the different plant materials were covered up with chloroform in bottles; the latter were stoppered, well shaken and brought over to the laboratory. The supernatant chloroform was filtered off in all the cases and on evaporating off the solvent under reduced pressure, about 1·5-2·0 oz. of the residue was obtained from about 6 lbs. of the plant matter. These residues have been preserved for further work.

Immediately after removal of chloroform, the collected plant materials were covered with acetone, shaken well and cold extracted for two days in the first instance. The acetone solution was then filtered off, the solvent removed under low pressure, and extracts were prepared after finally drying under high vacuum. Six extracts were thus prepared corresponding to the different plant parts taken. The percentage tannin contents were determined in all the extracts by the standard hide powder method. The acids were determined potentiometrically,[11] and the salts, using ion exchange resin Zeo-carb '215'. The results are given in Table I.

TABLE I

No.	Nature of the extract.	% tannin.	% non-tannin.	Acids mg. eq. 100 g. T.S.	Salts mg. eq. 100 g. T.S.	pH.	Colour of analytical solution.	Nature of tannin.
I.	Freshly cut roots from below soil level, kept for 3 days in chloroform and extracted with acetone in the cold.	73·55	13·11	82	17	3·40	7·0Y 1·5R	Pyrogallol.
II.	Freshly cut bark kept in chloroform for three days and then extracted with acetone in the cold.	68·33	20·22	64	Nil	3·70	10·0Y 7R	Mixture of pyrogallol and catechol.
III.	Freshly cut sapwood portion, kept in chloroform for three days and extracted with acetone in the cold.	53·00	27·11	88	Nil	3·30	2·5Y 1·0R	Pyrogallol.
IV.	Freshly cut heartwood portion kept in chloroform for 3 days and extracted with acetone in the cold.	45·5	40·4	98	Nil	3·70	2·5Y 0·9R	"
V.	Freshly cut leaves taken up in chloroform for 3 days and extracted with acetone in the cold.	31·77	19·88	128·9	Nil	3·30	3·5Y 0·7R	"
VI.	Fresh fruits taken up in chloroform for 3 days and extracted with acetone in the cold.	78·33	18·80	153	40	3·15	2·0Y 1·5R	"

Y — Yellow; R — Red.

Chromatographic studies were carried out using two dimensional techniques after White *et al.*[12] The solvent system tertiary amyl alcohol: water: acetic acid, (60:940:1) was used for the first dimension and secondary butyl alcohol saturated with water for the second. The chromatograms were developed using ferric chloride and potassium ferricyanide (50 ml. of 3% ferric chloride made upto 900 ml. with water, and the whole made up to a litre with 0·3% potassium ferricyanide). The R_f values and the details about chromatograms are given in Table II.

Nature of extracts from different parts of the plant

The extracts from the stem, roots and bark of the tree were dark reddish in colour, while the extracts from other parts of the plant, were yellowish suggesting that the former are of the condensed type and the latter of hydrolysable type. A complete qualitative estimation, according to Procter,[13] has however indicated the extracts from stem, heartwood and roots, to be polyphenolic in nature and belonging to the pyrogallol type of tannins, the bark of the tree has shown itself to be a mixture of both pyrogallol and catechol type of tannins. The root bark tannin have been found to be of pyrogallol type.

Discussion

The fresh fruits have maximum tannin percentage; however the other parts of the myrobalan tree also contain tannins, in smaller percentages. The maximum concentration of tannins occurs in the fruits (78·33%). The tannin percentages in the other parts of the tree are in the decreasing order: the roots—73·55%, bark—68·33%, heartwood—53·00%, sapwood—45·5% and leaves—31·77%. Except in the case of leaves, the non-tannins too correspondingly increase in this order. The insolubles content in the extract from the leaves was also high.

TABLE II

Extract Number.	Details about Chromatogram.		Rf Values											
I.	Six clear cut spot with some trailing in I dimension.	Spot No.	1	2	3	4	5	6						
		I Dn.	0·58	0·23	0·21	0·24	0·00	0·00						
		II Dn.	0·14	0·09	0·15	0·25	0·63	0·72						
II.	Four clear cut areas with trailing in the I dimension.	Spot No.	1	7	8	9								
		I Dn.	0·63	0·54	0·43	0·58								
		II Dn.	0·13	0·63	0·74	0·82								
III.	Six clear cut spots with some trailing in I dimension.	Spot No.	1	2	3	4	5	6						
		I Dn.	0·60	0·28	0·23	0·24	0·02	0·04						
		II Dn.	0·17	0·11	0·15	0·23	0·60	0·66						
IV.	Four clear cut spots, the rest being light in colour; very little trailing.	Spot No.	1	2	3	4	14	15	16					
		I Dn.	0·49	0·21	0·20	0·23	0·33	0·22	0·40					
		II Dn.	0·14	0·10	0·17	0·23	0·31	0·46	0·54					
V.	Four distinct clear cut areas; two clear cut but light areas; no trailing.	Spot No.	2	4	10	11	12	13						
		I Dn.	0·21	0·30	0·16	0·22	0·30	0·38						
		II Dn.	0·12	0·30	0·58	0·52	0·65	0·70						
VI.	Clear cut areas with very little trailing.	Spot No.	A	B	C	D	E	F	G	H	I	J	K	L
		I Dn.	0·98	0·91	0·75	0·61	0·64	0·54	0·79	0·58	0·21	0·10	0·15	0·34
		II Dn.	0·03	0·02	0·05	0·25	0·49	0·63	0·75	0·54	0·43	0·35	0·51	0·36
										M	N			
										0·34	0·31			
										0·31	0·12			

While the heartwood was thick, brownish and compressed the sap wood was fresh and light coloured. The presence of salts is noticed in the extracts from roots and fruits; in other parts such as bark, stem, sapwood, heartwood and leaves they are conspicuously absent even though the acid content increases from roots upwards to the fruits. Possibly there is some chemical conversion of these salts, somewhere inside the plant, and this may have something to do with the ripening of nuts, since fruits have comparatively higher acid as well as salt content. The tannin-nontannin ratio is quite high in the case of extracts from fruits and roots, the percentage of tannins also being high: in other cases, it is uniformly lower. It may be, that increase in tannin percentage, leads to a decrease in the non-tannin percentage, possibly indicating conversion of nontannins into tannins at some stage. The acid content gradually increases from roots to fruits, excepting for a low value in the case of bark; the pH value also decreases more or less proportionately; the pH value of analytical solution from the bark extract, is however, high. This is in agreement with the interesting fact, that the bark extract was found to contain a mixture of pyrogallol and condensed tannins, hence higher pH value as well as lower acid content. The absence of salts in several parts of the plant may be possibly due to the late season and maturity of fruits. There is possibly no transfer of salts from one part of the plant to the other. Hence they are concentrated only in roots and fruits. Probably with greater data on seasonal, soil and age differences of myrobalan, a correlation may be found leading to the origin and progress of tannins, and such other constituents in the trees. It is of economic interest to note that the leaves and bark contain fairly good amounts of tannins. If the same content is maintained in the dried leaves, and dried bark, the bark and leaves could be profitably utilised for tanning.

Nature of Myrobalan tree tannins

The qualitative examination of extracts from different parts of the tree, has suggested, that only the extract from the bark provides a mixture of hydrolysable and condensed tannins, while the extracts from other parts are purely hydrolysable type. King and White[14] who noticed hydrolysable tannins in leaves and sapwood of the quebracho tree but only condensed tannins in the heartwood suggested the leaves synthesised hydrolysable tannins which constitute the polyphenolic raw material, these ultimately getting converted into condensed tannins in heartwood.

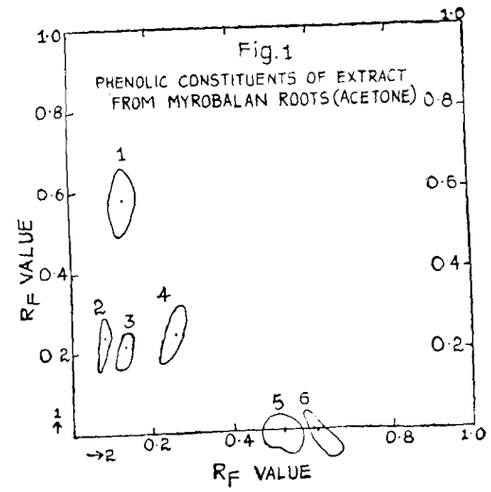
Our own findings indicate that this does not apply in the case of the myrobalan tree. The heartwood region of the myrobalan tree contains tannins but only of the hydrolysable type. Except the bark where a mixed type of tannins occurs, all the other parts of the tree have shown only pyrogallol type of tannins. Thus the observations, pertaining to quebracho tree may not hold good in the case of myrobalan tree which contains almost exclusively the hydrolysable type of tannins. The transformation of tannins from pyrogallol type in the leaves to condensed type in the heartwood is not observed in the case of myrobalan tree. An altogether different mode of transformation may be taking place in the case of this class of tannins. The dark colours of the extracts from heartwood, roots, bark, etc., resemble that of the condensed type; further investigation into the same may throw some light on the problem.

Chromatographic Studies

Reference to Figures 1-6 which represent the chromatograms of different parts of the tree indicates the presence of maximum number of components in the fruits. 14 components are indicated in fruits and about 6 in the roots, the heart and sap woods, with the bark containing 4 components. There was trailing in the chromatograms from

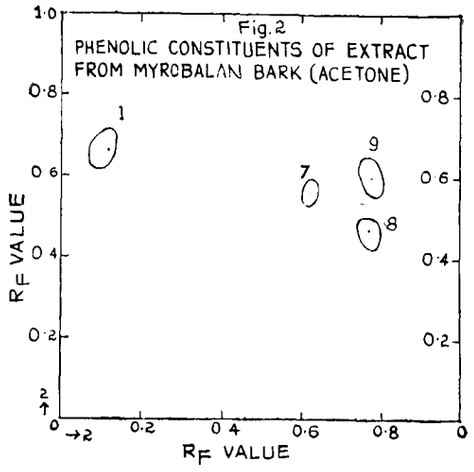
the bark and heartwood extracts. The others were well defined. Commercial myrobalan extracts examined by White *et al.* chromatographically have contained quite a number of components of which the following eight have been identified, (1) Chebulic acid, (2) Glucogallin, (3) Gallic acid, (4) Corilagin, (5) 3 : 6 digalloyl glucose, (6) Chebulagic acid, (7) Ellagic acid and (8) Chebulinic acid. Chromatograms of extract from ripe nuts, have indicated the presence of gallic acid, ellagic acid, chebulinic acid, corilagin, and chebulagic acid, thereby indicating that glucogallin, chebulic acid and 3:6 digalloyl glucose identified in the commercial extracts are absent in the fresh ripe fruits. Some of the substances detailed in dried nuts may have arisen during drying due to subsequent changes.

Close examination of the chromatograms of roots, heartwood and sapwood reveals that a number of components possess similar patterns and close R_f values (Spot Nos. 1-6 in Figs. 1 and 3; Nos. 1-4 in Figs. 1 and 4; No. 1

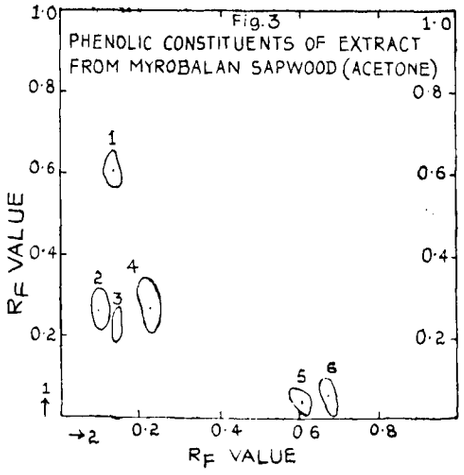


in Figs. 1 and 2). The heartwood does not possess components 5 and 6, while the roots and sapwood possess them. It is also noticed that, few of the known or unknown components present in the fresh

ripe fruits are in common with those that are observed in the other parts of the plant, such as heartwood, roots, sapwood, leaves etc. Heartwood has newer com-

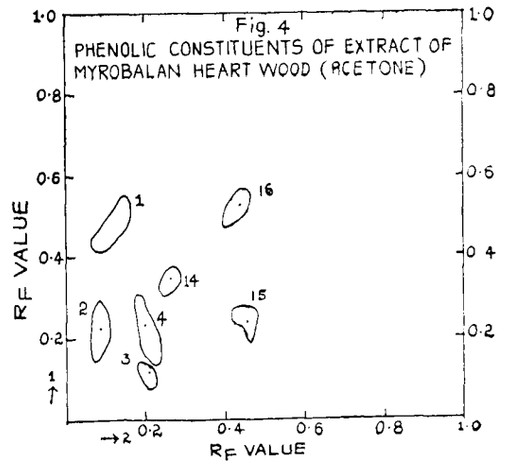


ponents (Nos. 14-16) which are absent in all other parts of the plant. The leaves also have as well components different from the other parts of the plant excepting, two

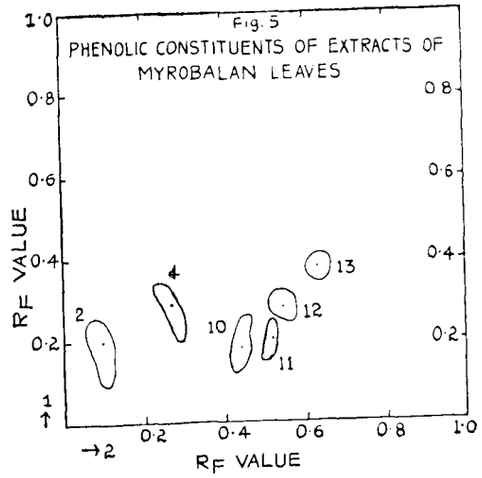


which are similar to those found in fresh fruits. Referring to the bark, it is noticed that there was considerable trailing in the first dimension. A change in solvent system may be

necessary, as the tannins present are of the mixed type. Another component, Spot No. 9 of Fig. 2, which is similar to the one occurring in fresh ripe fruits (G of Fig. 6), is gallic

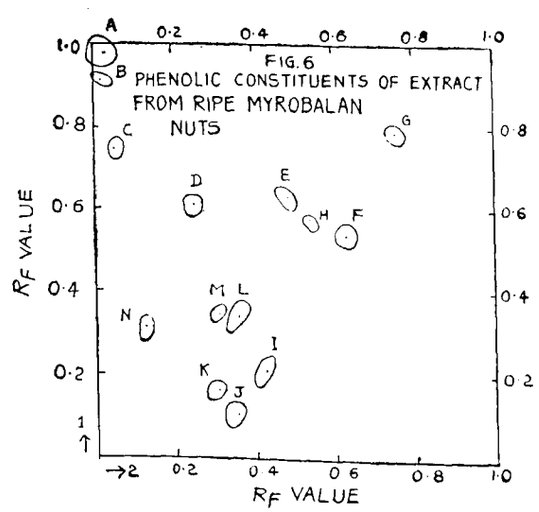


acid with its close R_f values. Thus we find, that generally the components occurring in different parts of the plant, are not the same; in some parts however common consti-



tuents occur. In general, it could be suggested, possibly chemical interaction of the polyphenolic substances in the

plant, with raw materials present inside the plant occur, resulting in greater number of components, in the fruits. Identification of the several unknown constituents is very



necessary before affording an explanation for the appearance and disappearance of some of these constituents in different parts of the plant.

Conclusions

1. Tannins occur in all parts of the myrobalan tree.
2. Maximum concentration of tannins occurs in the nuts, the roots, bark, wood and leaves containing less and less amounts; sapwood and leaves have least tannin content.
3. Excepting in bark, where a mixture of pyrogallol and condensed type of tannins occurs, in all the other parts only pyrogallol type of tannins occurs.
4. There is a possibility for leaves being used profitably for tanning.
5. The various polyphenols occurring in the different parts of the tree, have some constituents in common.

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RESEARCH BEARS FRUIT

Practical Demonstration No. 6

(Third Series)

Manufacture of chrome/vegetable tanned 'crushed kid'

BY

J. C. DEB

Introduction

'Crushed kid' is a high class leather, manufactured from goat skins by chrome/vegetable tanning process for making high class ladies and gents shoes, hand bags, and fancy articles etc. This leather is manufactured as an allied line of glazed kid industry similar to that of shrunken kid, suede kid, gold and silver kid, etc. The leather may be processed from the raw to finish or may be selected at the blue stage of glazed kid lot. Usually the skins of poor substance, and drawn and rough grains are selected at the blue stage of glazed kid lot for this production. The qualities required in the finished leather are softness, strength, pliability, round feel, nonstretchiness, non-crackiness and fast to light and air. This field is quite new in Indian market and the demand for foot-wear and fashion is ever increasing in India day by day, which can be profitably explored and exploited by the Indian tanners specially by the glazed kid manufacturers.

Processing of chrome/vegetable tanned "crushed kid"

Raw materials

50 pieces medium grade wet salted Madras quality goat skins of average size 34″ — 40″ (86 cm — 102 cm) with good substance are taken.

Process demonstrated in June/July 1959.

Soaking

The skins are soaked for two hours in plain water. They are then taken out, trimmed, broken on the flesh side over the beam by a blunt knife and washed thoroughly in running water for one hour to remove the salt. The skins are then taken out, drained and weighed for painting and liming.

Painting

Unhairing is done by painting a depilating paste of the following composition (for a pack of 100 skins):

Sodium sulphide: 1 part, i.e., 4 lbs. (1·8 kg.)

Slaked lime: 15 parts, i.e., 60 lbs. (27·2 kg.)

Sodium sulphide is dissolved separately in water. The solution is then added to the mixture of lime and water (care is taken to get a homogeneous paste) and cooled to the room temperature. It is better to prepare the paste one or two days prior to use.

The paste is applied to the flesh side of the skin. The skins are then piled up on a platform, flesh to flesh overnight. Next day the skins are taken out, unhaired and put into an once used lime liquor containing 5% new lime on the soaked weight of the skin, in a paddle or pit, for two days. Hauling and replacing is done thrice a day.

On the third day, the skins are taken out, scudded and put into fresh lime liquor containing 10% lime on the soaked weight of the skin, in a paddle, for two days. The paddle is run three times a day. On the 3rd day the skins are examined for sufficient plumpness and taken out, fleshed, rescudded, weighed and washed throughly in running water for 15-20 minutes in a paddle and are ready for deliming and bating.

Deliming

The washed pelts are then delimed with the following:

Ammonium chloride : 1%-1½% (on the fleshed weight)
Water : 200%-280% ,, ,,

The required amount water and skins are put inside the drum. Half the quantity of the ammonium chloride is added and the drum run for 15 minutes. The remaining half is then added and the drum run for another 45 minutes. The delimed pelts are washed in plain water and put into the bating bath.

Bating

The delimed pelts are bated in a covered paddle using 1·5% Pancreol 5A and 300% water on the fleshed weight. The temperature of the bath is kept at 104°F (40°C) until the stock is satisfactorily bated. The pH of the bate liquor before unloading should be round about 8·0; if not, it should be adjusted to that value.

After the completion of bating, the pelts are taken out, scudded well, washed in cold water, weighed, and are ready for pickling and tanning.

Pickling

The pelts are pickled in a drum using the following composition:

Common salt	:	8-10% on the fleshed weight
Sulphuric acid (1·84)	:	1-1¼% „ „
Water	:	100%-150% „ „

Salt is first dissolved in water in the drum and the skins are put and the drum run for 5-10 minutes. The sulphuric acid is diluted and added into the revolving drum through the hollow axle and the drum is run one hour. The pelts are left in the pickle bath overnight.

Next morning the pelts are drummed for 30 minutes. Half the quantity of pickle liquor is run off, the pickled pelts and the remaining liquors are allowed to remain in the drum.

Chrome tanning

One bath process is followed. 33⅓% basic chrome liquor is used which is made from:

Bichromate of soda:	:	100 lbs. (45·36 kg)
Sulphuric acid (1·84 sp. gr.):		90 lbs. (40·82 kg)
Molasses	:	40 lbs. (18·14 kg)
Water to make	:	50 gallons (227·3 l)

At first a small quantity of water (about 2½ gallons *i.e.* 11·4 l for a pack of 100 lbs. *i.e.* 45·36 kg skins) is added, the total volume of the added water and pickle bath being sufficient. To this, chrome liquor diluted with 50% water on the fleshed weight is added in two instalments. First instalment is added through the hollow axle into the running drum and drummed for 30 minutes. The second instalment is then added and run for three hours more. Total quantity of 33⅓% basic liquor used is equivalent to 3%-3½% bichromate of soda on the fleshed weight.

Preparation of 50% basic chrome liquor

The 50% basic chrome liquor can be made from 33⅓% basic liquor by adding requisite quantity of soda ash solution as follows :

50 gallons (227·3 l) of 33⅓% basic chrome liquor equivalent to 100 lbs (45·36 kg) bichromate of soda will require for basification into 50% basic liquor, the slow addition of 18 lbs. (7·87 kg) of soda ash, dissolved in 5 gallons (22·7 l) of water with stirring. The 50% basic chrome liquor is then diluted and added to the same bath in one instalment through the hollow axle into the running drum and drummed for 2 hours more and left overnight. Total quantity of 50% basic chrome liquor used is equivalent to 2%-2½% bichromate of soda on the fleshed weight. Next morning, the drum is run for 30 minutes and 1% soda bicarbonate on the fleshed weight of the skin dissolved in a small quantity of water is added to the running

drum in two instalments at an interval of 15 minutes. The drum is run for 1-2 hours more. The pH of the stock should be 4·0-4·5; when the boiling test is satisfied tanning is completed. The leathers are then taken out and piled up overnight.

Sammying and shaving

The leathers are then slicked or put out on the flesh side, sammed, shaved and weighed for neutralising, fat-liquoring and retanning.

Neutralisation

After thorough washing the leathers are neutralised for one hour with 1%-1½% sodium bicarbonate and 200-250% water (on the shaved weight of the leathers). Then the leathers are washed thoroughly. pH of the skins is ensured to be 5·5 to 6·0. The washed skins are then dipped in hot water at 130°F (54·4°C) for 10-15 minutes.

1st fat-liquoring:

The neutralised skins are now fatliquored in a drum with sulphated fish oil: 1-1½% (on the shaved weight).

Water: 200-250% „ „

Water at 130° (54·4°C) is taken in a drum. The stock is entered into the drum and the drum started. The fatliquor made into an emulsion is added into the revolving drum through the hollow axle and the drum run for 30-45 minutes. The stock is then piled up on a horse overnight.

Vegetable Re-tanning is carried out in a drum with :

Quebracho extract	:	15-20% on the shaved wt.
Sumac powder	:	7%-10% „ „
T. R. O.	:	½-1% „ „
Water	:	100-150% „ „

Temperature of the tan bath maintained at 130°F (54·4°C).

Half the quantity of the above mixture is taken into the drum at 130 F (54·4°C). The stock is entered into the drum and drummed for ½ an hour. The remaining half of the mixture is added through the hollow axle and the drum run 2½ hours more. The leathers are then taken out and dipped in hot water at 130 F (54·4°C) for 10-15 minutes. They are now ready for second fat liquoring.

Second fat liquoring

The stock is now fat liquored with:

Raw fish oil	:	1%-1¼% on the shaved wt.
Fixanol V.R.	:	¼%-½% „ „
Water	:	200%-250% „ „

Water at 130 F (54·4°C) is taken in the drum. The leathers are entered into the drum and the drum started. The fatliquor is then made into emulsion and added into the revolving drum through the hollow axle and the drum run for 30-45 minutes. The leathers are then piled up on a horse overnight.

Sammying and oiling

Next morning the leathers are slicked out and oiled with a mixture of one part Neats' foot oil and one part kid finishing oil and hung up for complete drying.

Saw dusting, staking, buffing and trimming

The dried leathers are stored for some days for conditioning. They are then saw dusted overnight in moist saw dust to condition then for staking. The conditioned leathers are first staked with light pressure by a Slocomb staking machne, aired off for sometime, and staked again with the same machine, with considerable pressure. The skins are then buffed on the flesh side using 80 grit emery paper. The leathers are trimmed and ready for finishing.

Staining and seasoning

Finishing is into three different shades viz., champagne, light blue and light green. The leathers are first stained

with the following stain coat on the grain side by brush, dried and then given two successive bottom season coats on the grain side with the following bottom season.

Note: In the case of darker shades viz., black, dark brown etc., dyeing may be done with suitable dyestuffs just before second fatliquoring. But in case of pastel shade staining coat is preferable in dyeing.

Staining coat

(1) Champagne Basic orange dye : 1 gm.
Acetic acid : 5 gms.
10% Linseed mucilage : 1 oz. (28·4 gms.).
Water to make two pints : (1·13 l).

(2) Light blue:
Basic blue dye : 1 gm.
Acetic acid : 5 gms.
10% Linseed mucilage : 1 oz. (38·4 gms.).
Water to make two pints. : (1·13 l)

(3) Light green:
Basic green dye : 1 gm.
Acetic acid : 5 gms.
10% Linseed mucilage : 1 oz. (28·4 gms.).
Water to make two pints : (1·13 l).

Composition of season:

C.L.R.I. White pigment paste : 20 oz. (567 gms.)
„ Yellow pigment paste : 1 oz. (28·4 gms.).
„ Orange & black pigment paste : Touch to adjust the shade.
10% Casein solution : 15 oz. (425·0 gms.).
C.L.R.I. Binder (Hard) : 10 oz. (283·5 gms.).
10% Wax emulsion : 5 oz. (142·0 gms.)
Diethylene glycol : 2 oz. (56·7 gms.).
T.R.O. : 1½ oz. (42·5 gms.).
Ammonia : 1 oz. (28·4 gms.).
Water to make : 1½ gallons (6·82 l).

Two pad coats of the above season are applied on the grain side and allowed to dry. The dried pieces are then staked with considerable pressure. One spray coat is then applied and allowed to dry. The dried leathers are then smooth plated with light pressure and boarded on the grain side by hand. One more spray coat is then applied and dried. The leathers are ready for top fixing coat.

Top fixng coat :

10% Casein solution : 1 part
Formaldehyde : 1 part
Water : 6 parts

A spray coat of the above fixing coat is given and allowed to dry. The dried leathers are again boarded by hand on the grain side, and the grain side rubbed with a clean cloth. The leathers are measured and are ready for disposal.

(2) *Light blue* :

C.L.R.I. white pigment paste : 20 ozs. (567 gm.)
„ Royal Blue : 2 ozs. (56·7 gm.)

Other ingredients and procedure are same as for champagne colour leather No. (1).

(3) *Light green* :

C.L.R.I. white pigment paste : 20 ozs. (567 gm.)
„ Light Green : 2 ozs. (56·7 gm.)

Other ingredients and procedures are same as for champagne colour leathers (1).

TECHNICAL SEMINAR

Group Discussion of the Leather Sectional Committee of the I. S. I.

The members of the Leather Sectional Committee of Indian Standards Institution met the staff of the Central Leather Research Institute at a group discussion held on 29th May, 1959. Dr. Sadgopal, Deputy Director (Chemicals), Indian Standards Institution, New Delhi, presided on the occasion. The other members of the Indian Standards Institution Committee present at the discussion were :—

(1) Dr. A. Seetharamiah, Development Wing, Ministry of Commerce & Industry, New Delhi.

(2) Shri Sanjoy Sen, The National Tannery Co., Ltd., Calcutta.

(3) Shri N. R. Sarkar, Bata Shoe Company Private Ltd., Calcutta.

(4) Shri P. C. Sarin, Reckitt & Colman of India Ltd., Calcutta.

(5) Shri M. Bhattacharjee, Commerce & Industries Department, Govt. of W. Bengal.

(6) Shri J. Gosh, Small Industries Service Institute, Madras.

(7) Shri R. A. Bhote, Directorate of Marketing & Inspection (Agriculture), Nagpur.

(8) Shri N. R. Lodh, Development Wing, Ministry of Commerce & Industry, New Delhi.

(9) Shri P. C. Ahluwalia, Ordnance Factories, Calcutta.

(10) Shri M. S. Saxena, Chemicals Division, Indian Standards Institution, New Delhi.

(11) Shri U. A. Menon, M/s. Gordon Woodroffe Leather Manufacturing Co., Pallavaram.

At the outset, Dr. Sadgopal elucidated the convention of the Indian Standards Institution in regard to the drawing up of standards for the various items, and how the Leather Sectional Committee and C.L.R.I. were helpng in drawing up standard specifications for leathers; he then requested the Committee members to suggest problems, of interest to the Industry, that could be tackled at C.L.R.I.

The discussion centred chiefly around (1) Production of shrunken grain leather using indigenous vegetable tanning materials as a substitute for syntan or sumach, (2) Water proofing of sole leather and (3) Waxes for use in leather polishes.

While the Italians had successfully used sumach in the production of shrunken grain leather, the practice in vogue in the Continent and other places now was to use syntan for this purpose. The point of interest was whether any one of the indigenous Indian vegetable tanning materials could be used in this regard, e.g. myrobalan.

In view of the fact, emerging from work at Central Leather Research Institute, that with acetone extract of myrobalan, leather of good quality type was obtained, it was thought possible to successfully substitute sumach or syntan by myrobalan.

By combining aluminium tannage with a subsequent dipping in stearate the water absorption of sole leather could be brought down from 35-40% to 5-15%. The question also arose whether the problem was one of lessening the percentage of water absorption only or actually of completely eliminating it. Tallow was a material which could be thought of in this connection, as also impregnation with latex. The Russians who subjected their shoes to rigorous climatic conditions were of the opinion that impregnation

was not the solution. They hot-pitt tanned sole leather with Quebracho liquor of high Bk°. It was not clear, however, whether sulphited or unsulphited extract was used. The best possible solution would be that which retained permeability and at the same time brought about water proofness.

Of the different modified sugar-cane waxes put forth by the National Chemical Laboratory only one was useful. The problem was one of finding a suitable substitute for the imported waxes. Shellac wax was considered to be of promise for this material was imported by other countries and then used.

The Chairman in his concluding remarks, referred to the necessity for taking steps to study scientfically the various indigenous tanning practices and also to compile information about indigenous tanning materials, if steps had not been taken already.

TECHNICAL SEMINAR

Studies on Enzymic Unhairing and Bating *

BY

S. C. DHAR

Methods were developed for the production of enzyme bates and depilants, making use of indigenous raw materials and proteolytic enzymes derived from microbial sources. Different grades of C.L.R.I. Enzyme bates and depilant were prepared. Comparative chemical, physical and microscopical studies on the quality of leathers produced by using C.L.R.I. Enzyme bates and pancreol bates were made. A systematic study was also made on chemical, physical and microscopical characteristics of the leathers produced by unhairing with mold protease and lime-sulphide mixture. The keeping quality at different temperatures of twelve samples of enzyme bates, depilant, solvent and salt precipitated enzymes, purified enzyme and other enzyme preparations with and without the addition of pancreas, wood flour or ammonium sulphate was systematically studied and the results obtained with regard to each sample were critically discussed.

* Condensed from the talk given on 3-6-1959.

TECHNICAL SEMINAR

Leather Boards *

BY

K. RADHAKRISHNAN

Leather Boards, which are used as insoles, mid soles, stiffeners, etc., in the Shoe & Footwear Industry are manufactured from the tannery waste materials and by products of shoe factories like shavings, buffings and trimmings, etc., which are in abundant supply.

The first step in the leather board manufacture is getting a finely divided pulp from the waste materials and this is accomplished in the "Condux Mill". Before being ground, the raw material is made soft by soaking in a very dilute sodium carbonate solution.

The pulp is washed free of all water solubles and excess tannins. The washed pulp is put into the Hollander Beater, where the pulp is diluted to about 5% solids content. A suitable quantity of the binder, rubber latex is added, after the addition of sufficient quantity of a softening agent for getting the desired pliability in the final board. The whole mixture is agitated well and then a measured quantity of pulp is transferred over the sieves for filtration. Next the wet boards are pressed in the hand press, dried in the shade and finally pressed in a hydraulic press.

Various fillers like rag, cotton, wood, bagasse, etc., can be incorporated and the amount of filler depends on the use for which the board is meant. A complete analysis of the raw material has been carried out to assess the oil and tannin contents and also the boards have been tested for their physical properties.

* Condensed from the talk given on 26-6-1959.

CLASSIFIED ABSTRACTS

OAK BARK TANNINS. *D. E. Hathway. Biochem. J.* **70,** 34-42 (1958); *Chem. Abst.*, **52,** 20409 (1958). (+)-Catechin (*I*) and (+)-gallocatechin (*II*) and leucodelphinidin (*III*) were, respectively isolated from the Et_2O and ethyl acetate-soluble fractions of oak-bark phlobatannins. *III*, $C_{15}H_{14}O_8 \cdot H_2O$, has been characterized by heptaacetate derivative, m. 140-4°. *I* accounts for 1% of the dry weight of young bark, *II* for up to 1% and *III* for 0·5%. Oak-bark phlobatannin, $C_{15}H_{10}O_7 \cdot 2H_2O$, was isolated in considerable yield by cellulose-column chromatography, and exhibits an absorption band at 285 mμ and diminishing absorption in the region 300-600 mμ. Oak cambium exhibits polyphenoloxidase activity which is inhibted by 4-nitrocatechol. *II* was oxidized by this enzyme faster than *I* and *III*. *II* and *III* oxidation polymers exhibit the same absorption spectrum, have the same analytical properties and similar elementary analyses to those of oak-bark phlobatannin. Aerobic oxidation of mixed synthetic substrates, such as 5-methylpyrogallol (*IV*) and 5-methoxy-4-methylresorcinol, or *IV* and phloroglucinol, by polyphenoxidase gave polymers which showed the characteristic absorption of *II*-oxidation polymer, oak-bark phlobatannin, and *IV* oxidation polymer. The conclusion: phlobatannin is formed by the aerobic oxidation in the cambium of principally *II* through a tail to tail quinone-polymerization mechanism. The increase in tannin concentration of oak stem-bark from crown to butt suggests a downward movement of the phenolic metabolites from leaves through the phloem. *IV* has been synthesized, starting with Me orsellate in an Et_2O solution. $ZnCl_2$ and $Zn(CN)_2$ were added and HCl gas passed through for 4 hrs. The aldimine-HCl crystals were removed, washed with Et_2O and dissolved in H_2O heated at 100° 40 min. After cooling 16 hrs., the solution was steam distilled yielding Me hematommate which crystallised from MeOH, m. 147°. A small amount of Me isohematommate formed. Hydrolsis of Me hematommate gave atranol which was converted to *IV* by the Dakin reaction, m. 119°.

INVESTIGATION OF FORMATION AND CONVERSION OF CATECHINS IN TEA-LEAVES USING $C^{14}O_2$. *M. N. Zaprometov and A. L. Kursanov. Fiziol. Rastenii Akad. Nauk S.S.S.R.* **5,**

310-19 (1958); *Chem. Abst.* **52**, 20443 (1958). Young leaf-shoots of Georgian type of tea plant contain (in mg./gm. dry wt.) sucrose 7·2, glucose 1·0, fructose 0·72 and two more complex sugars, which according to their R_f values correspond to raffinose (1·8) and stachiose (small amt.). When the shoots are kept in an atmosphere containing $C^{14}O_2$ in light, 82% of radioactivity is found in sucrose and 15% in the glucose and fructose. Raffinose is labelled to a small extent. During the first 2 hours radioactive catechins are produced, simple catechins are labeled stronger than their gallates. After removal of $C^{14}O_2$ and light the radioactivity of catechins is observed for another 3 hours, the radioactivity of gallate increases for an additional length of time. It is assumed that a large part of the sugars is used up in the synthesis of catechins.

BIOCHEMICAL STUDIES OF LIGNIN FORMATION. II. *Takayoshi Higuchi. Physiol. Plantarum* **10**, 621-32 (1957) (in English); *Chem. Abst.* **52**, 20117 (1958). Lignin (*I*) formation on the embryonic root tips of kidney bean and bamboo-shoot tissue cultivated in buffer solutions containing phenyl propanes (*II*) (Coniferyl alcohol (*III*) eugenol (*IV*) isoeugenol, synap acid, synap alcohol, etc.), was followed by Maule and Cl_2-Na_2SO_3 color reactions. Such *I* formation was more rapid in the presence of H_2O_2 along with *II*, while the presence of enzyme inhibitors (Hg salts) reduced the formation of *I*-like products. Coniferyl aldehyde was condensed to *I*-like substance with peroxidase and H_2O_2 while purified *IV* was unchanged. Ascorbic acid and glutathione were decreased markedly in the lower portion of bamboo shoots. It is suggested that *III* was condensed oxidatively to *I* by peroxidase, because of the disappearance of these reducing substances.

CHEMICAL COMPONENTS OF THE BARK OF PHYLLANTHUS EMBLICA LINN. *K. R. Laumas and T. R. Seshadri. J. Sci. Industr. Res.* **17B**, 167 (1958).

Air dried bark of *Emblica Officinalis* or *Phyllanthus emblica* was subjected to a series of exhaustive extractions in the cold using successively light petroleum, ether and acetone. The compound recovered from the light and petroleum fraction was identified to be lupeol. A small quantity of the same compound was obtained from the ether extracts also. The compound obtained from the acetone extract is considered to be leucodelphinidin.

The rotation and the melting points of the leucodelphinidin and its derivatives showed that it was the same isomer as was

earlier found in the kino of *Eucalyptus pilularis* and different from the sample obtained from Karada bark.

SUMAC TANNINS II. The "tannic acid" of Rhus typhina. *Wolfgang Grassmann, Horst Endres, and Norbert Munch. Chem. Ber.* **90**, 838-9 (1957); *Chem. Abst.* **52**, 21191 (1958). Successive EtOAc extractions of the "tannic-phenol" (*I*) from the neutral buffered mixture of Me_2CO-solution, "tannic acid" (*II*) and *I* from *R. typhina* disturbs the undissociated phenol-anion equilibrium and raises the pH to 8 with the formation of the Na salt of *I*, so that *I* is not extracted completely; for proper separation, the pH must be corrected to 7 between each extraction. A yield of 66·1% *I* and 0·92% *II* was then obtained. *II* by paper chromatography and electrophoresis contained *m*-digallic acid and gallic acid (*III*); after a 6 hour hydrolysis with 5% H_2SO_4 only *III* was found.

STUDIES IN CHROME TANNING. III. SPECTROPHOTOMETRIC INVESTIGATIONS IN THE ULTRAVIOLET REGION OF CHROMIUM COMPLEXES. *Yasuhiko Ono and Yukio Okada Himeji Kogyo Daigaku Kenkyu Hokoku No.* **9**, 8-13 (1958); *Chem. Abst.* **52**, 21192 (1958). Ultra-violet absorption spectra of Cr complex compounds in the presence of various masking agents were measured in order to elucidate the structure of the compounds. A variety of factors such as the kind and amount of masking agents added and the aging period after the addition of the agent exert considerable effects on the absorption spectra. Furthermore, it was found that there were 2 groups of masking agents. One of them is an organic group which caused an increase in extinction with the progressive aging while another is an inorganic such as sulfite, nitrite, etc. which causes a decrease. Of the organic masking agents, a new absorption peak was observed in case of oxalate, since oxalate ion penetrated into the complex compound during aging.

CHROME TANNING. IV. CHARGE DISTRIBUTIONS OF COMPLEX IONS IN ORDINARY CHROMIUM LIQUORS. *Akira Kawamura, Keizo Wada, and Hiroshi Okamura. Nippon Nogei-Kagaku Kaishi* **29**, 582-7 (1955); *Chem. Abst.* **52**, 21192 (1958). Distribution of complex Cr ions in chrome-tanning liquor is examined, by a new method in which ion exchange with Na polystyrene sulfonate and Amberlite IR-4B is used. $K_2Cr_2O_7$ solutions treated with glucose, MeOH, glycerol, $(CH_2OH)_2$, $Na_2S_2O_3$ or SO_2 are analyzed. It is found that chrome liquors have special charge distributions of complexes in accordance with the kind of reducing agent used. The amount of individual Cr complex is changed im-

mediately after the reduction and becomes constant with the progress of aging for approximately a week. Ordinary aged chrome liquors can be classified into 2 groups after the type of cationic Cr complexes present in the solutions; one mainly consists of [Cr III Complex]$^{1+}$ [Cr III complex]$^{3+}$ and the other [Cr III Complex]$^{3+}$ alone. The liquors prepared from $K_2Cr_2O_7$ treated with glucose or MeOH and then by H_2SO_4 are found to belong to the former group. V. Some assumption of the molecular size of colloidal chromium complexes with ion exchanger. *ibid.* 587-90. The increase in the particle size of Cr complexes on addition of alkali is established by styrene-type ion exchangers of various cross-linkings. There are 2 groups of chrome liquors, one increases molecular sizes somewhat homogeneously and the other heterogeneously. Solutions of [Cr. III complex]$^{1+}$ or liquors containing [Cr III Complex]$^{1+}$ as a main constituent are found to increase their particle size hetergeneously.

THE MANUFACTURE OF LEATHER WITH THE USE OF SULFOCHLORIDES. *A. I. Metelkin and V. N. Semenova. Legkaya Prom.* **18**, No. 8, 19-21 (1958); *Chem. Abst.* **52**, 21194 (1958). The use in tanning of sulfo-chlorides formed by the interaction of SO_2, Cl_2 and aliphatic hydrocarbons, e.g., $C_{28}H_{57}SO_2Cl$, based on a paraffin of m.p. 45°, is described in detail. The product compares favourably with chrome-tanned leathers, for example a test specimen and a control showed, respectively thickness, 1·42 and 1·54 mm.; tear resistance 2·54 and 1·75 kg./sq. mm; stretch resistance 34·5 % and 39·5 %.

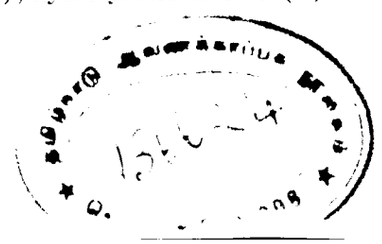
MOLECULAR WEIGHT OF CONDENSED TANNINS AS A FACTOR DETERMINING THEIR AFFINITY FOR COLLAGEN. *David G. Roux. Nature* **181**, 1793-4 (1958); *Chem. Abst.* **52**, 21194 (1958). Chromatographic studies involving black wattle bark and quebracho heart-wood tannin extracts indicate existence of a linear relation between the average molecular weights and the R_M values.

THE USE OF ION EXCHANGERS IN THE ANALYSIS OF TANNERY LIQUORS CONTAINING CHROMIUM. *A. Vos. Mededel. Lederinst.* T.N.O. No. **23**, 40, 1957; *Chem. Abst.*, **52**, 21191 (1958). The percentage Cr combining with a highly acid cation exchanger is larger for the H^+ form than for the Na^+ form. With a series of successive percolations the Na^+ form gives better reproducibility than the H^+ form. An exchanger with high porosity takes up much more Cr than one with moderate cross-linking, especially in the case of residual liquors. The results showed good

reproducibility provided concentrated liquors are analyzed immediately after dilution. Most often, failure of the exchanger can be detected by repeating the percolation several times. Generally speaking, in the case of normal tannery liquors the use of ion exchanger makes it possible to form an idea of the distribution of Cr in cationic, neutral and anionic complexes. The method, therefore, is very suitable to test tannery liquors on their uniformity. Difficulties arise with liquors containing very large particles which cannot penetrate into the ion exchanger, such as highly basic Cr chloride liquors (70%), anionic sulfite liquors, old residual liquors, and liquors with very high pH. Therefore, it is advised always to use ion exchangers with high porosity (few cross-links).

WATER ABSORPTION OF VEGETABLE TANNED COWHIDES WITH REFERENCE TO THEIR TOPOGRAPHY. *Edward Raabe. Prace Inst. Przemyslu Skorzanego* **1**, 1-36, (1955); *Chem. Abst.* **52**, 21193 (1958). Twenty cow hides preprocessed and tanned like harness leather, were divided into 4 groups: Standard (*I*), rolled (*II*), stuffed (*III*), and retanned (*IV*). *I* were mangled and dried for 6 days at 20-35°; *II* were dried like *I*, and rolled like sole leathers; *III* were soaked in warm H_2O, handgreased on the flesh side with a mixture containing tallow 30, degras 30, whale oil 30, and spindle oil 10 parts, and dried for 5 days at 20-32°; *IV* were treated with liquor containing quebracho 60, oak 20, and chestnut 20% extracts and then processed like *I*. Each leather was divided into 97 fields, 160 x 170 mm. in size, 49 on the under, and 48 on the upper side; 1380 disks, 72 mm. in diameter were cut, conditioned, and H_2O absorption as well as absorption rate in the grain-to-flesh direction were determined after Kubelka-Nemec and Bergman-Mickeley respectively. The results were compared with those obtained for *I*. Rolling decreased H_2O absorption moderately but lastingly, stuffing, more effectively and lastingly, and retanning effectively but only temporarily. Absorption was least in the lower parts of bends. The H_2O absorption determined in a standard area (near the root of the tail and the back-bone line) after 1, 2, 4, 6, 8, 10, 12, 24, or 48 hours of dipping is not equivalent to an average for the entire leather. Porosity of leathers, mechanism of H_2O absorption, and influences of liming, bating, tanning and finishing are reviewed.

REDUCTION OF THE CONTENT OF WATER SOLUBLE SUBSTANCES IN SOLE LEATHERS. Olgierd Rodziewicz and Jan Kraft. *Prace Inst. Przemyslu Skórzanego* **2**, 21-48 (1956); *Chem. Abst.* **52**, 21193 (1958). Glue (*I*), hydrolyzates thereof (*II*)



with 2-6% $H_2C_2O_4$ or solutions of KHC_2O_4 $H_2C_2O_4 2H_2O$, as well as dihydroxydimethylurea (*III*), 3 dicyanidiamide- (*IV*) and 3 urea-formaldehyde (*V*) resins, were used to decrease the content of H_2O-soluble substances (*VI*) in sole leathers. The qualities of *I*, *II*, *III*, *IV* and *V* were classified according to the amounts of tannin precipitated after Bohme and Schworzer from vegetable (wattle extract) or synthetic (Rotanine BNS) tannin materials. Laboratory and semipilot-plant studies with *I* or *II* on sole leathers gave no unequivocal results, those on insole leathers showed that *I* is superior to *II*. *III* was ineffective. *I*, *IV* and *V* reduced *VI* in bends and insole leathers in direct proportion to the amounts used. *IV* and *V* readily penetrated into the leather. Neither hardening nor grain cracking were noted, and abrasive resistance was but slightly reduced. The soles, thus produced, were tested in 75-day experiments and showed improved wear resistance.

THE EFFECTS OF TANNING AND FINISHING ON AREA CHANGES OF CHROME-TANNED LEATHERS. *Stanislaw Perkowski. Prace Inst. Przemyslu Skórzanego* **1**, 59-74 (1955); *Chem. Abst.* **52**, 21193 (1958). The leathers (*I*) obtained from 16 1-bath processes of different liquor basicities and components were kept at 20° and a relative air humidity of 30-100% for 6-7 days; they showed 8·9-20% changes in area. Repeated drying and damping of *I* reduced strongly their proneness to changes of area but also increased their stiffness, and reduced flexibility and tensile strength. The mode of drying was without effect within the limits of experimental error (2%). *I* kept at 70° for 1-2 days showed after repeated conditioning and drying slight changes in area and none in strength. When *I* were kept for 16 days at 70° their strength was reduced by 30%. One directional stretching to 6-30% of elongation of *I* caused only small changes in area.

CHELATING AGENTS IN THE DECOLORIZATION OF CHESTNUT EXTRACTS. *Alberto Simoncini, Cuoio, pelli, mat. concianti* **34**, 93-118 (1958); *Chem. Abst.* **52**, 21191 (1958). Experiments of decolorization of chestnut extracts containing Fe and Cu show that ethylene-diaminetetraacetic acid or Na salt (*I*) may chelate ionic Fe but not Fe combined with tannin molecules. Extracts treated with *I* or leather washed with solution of *I* may be noticeably decolorized, but the best results are obtained by adding *I* direclty in the tanning pits.

THE USE OF MEMBRANES FOR THE FRACTIONATION OF HIGH POLYMERS. *J. H. S. Green, H. T. Hookway, and M. F. Vaughan. Chem. & Ind.* (London) No. **27**, 862-3 (1958); *Chem. Abst.* **52**, 21213 (1958). A procedure is described for the preparation of a membrane (*I*) which was used to fractionate polymers in non-aqueous solution. *I* was prepared by casting on a level plate of glass a solution of methoxymethyl nylon 8·6 g., in EtOH 50, and glycerol 15 ml. The film was heated 4 hours at 60° followed by successive washing with H_2O, EtOH, 1:1 EtOH-toluene mixture and toluene. *I* was used as a membrane to separate polystyrene in toluene solution into high and low molecular fractions.

LEATHER THE IRREPLACEABLE MATERIAL FOR FOOTWEAR MANUFACTURE. *E. Belavsky & H. Hrebkek. Leather Trades Review*, **131**, 442 (1959). The water absorption powers of medical active carbon, industrial active carbon and chrome leather have been compared. During the first hour, medical active carbon absorbs 15%, industrial carbon 9% and chrome leather 8% moisture. Absorption to constant weight has been found to take 15 days. Desorption has been found to take much less time. With the carbon samples desorption to 0% moisture was achieved in 7 days. However, chrome leather could not be dehydrated to less than 8% moisture.

Leather contains moisture in three different states: (1) in large inner cavities, removable by pressing or centrifuging, (2) in very small capillaries, removable by dehydrating agents and (3) molecular water or water in the hydratic state, removable only by heating or drying at 105 C. Hydratic water has been observed in shoes even after 3 years of wearing. The hydratic water contents of different types of leather are given. Moisture content in leathers depends upon a number of factors, and physical properties of leather in turn depend on the moisture content. The variation of surface area of leather with moisture content is of much significance in shoe manufacture.

Work has been carried out in determining the factors which would eliminate area variations in leather. Drastic initial drying followed by conditioning has not been found to have a stabilising effect. Strong bating on the other hand, has been found to exercise such an effect. From hysteresis studies it has been shown that Secotherm dried leather has negligible hysteresis. Similarly strongly bated and two bath chrome tanned leather shows no hysteresis. Hysteresis studies would appear to show directly whether leather is stabilised regarding its area.

Plastics cannot be a successful substitute for leather in view of the breathing properties of the latter.

T. G.

THE AFFINITY OF COLLAGEN FIBRES FOR RADIO-ISOTOPES CALCIUM-45, SODIUM-24, POTASSIUM-42 AND IODINE-131 DURING THERMAL CONTRACTION. *F. Verzar and K. Huber. Gerontologia* **2**, 113-20 (1958); *Chem. Abst.* **52**, 20285 (1958). On thermal contraction an increase of Ca^{45} -exchange into the collagen fibre (from the tail tendons of the rat) was observed. The possibilities to be considered, however, were whether the isotope was being exchanged with (a) swelling fluid in thermal contraction, (b) as fluid which penetrates the polypeptide chains of the collagen in the transparent state on further warming, or (c) exchanged with the actual water of the fibres. It was concluded that there is an increased Ca affinity of collagen after thermal contraction. In a similar way tendon fibres show an increase in activity after thermal contraction if the Ringer solution contains Na^{24}, K^{42}, or I^{131}. In this situation the whole increase can be accounted for by the swelling observed during the contraction, and later in the Ringer solution containing the isotopes.

FIBROPLASIA. VIII. Changes in the rate of hydrolysis of connective tissue proteins during aging. *M. Chrapil and R. Zahradnik. Physiol. Bohemoslov.* **7**, 227-33 (1958); *Chem. Abst.* **52**, 20285 (1958). In this investigation a study is made of the rate of hydrolysis of collagen by dilute mineral acids, by paying particular attention to the structure of collagen. The aim of this work is to explain the significance of procollagen in the hydrolytic decomposition of collagen in organisms of different ages. A study of the rate of hydrolysis of some scleroproteins was made by utiliing the polarographic properties of dithiocarbaminocarboxylic acids; in most cases, however, hydrolysis was studied by determining the release of amino acids, which were transformed by means of nitrosation into the polarographically active N-nitroso compounds. Mechanically prepared collagen from the tail tendons of young rats was decomposed 60% more rapidly than collagen of the same origin from adult rats. Collagen prepared by repeated alkaline extraction from calf and bull lungs showed these differences to a less evident extent. All types of collagen examined, with the exception of the collagen from the tail tendon of young rats, after repeated washing in citrate buffer were decomposed 20-50% more rapidly than nonmodified collagen.

LINKAGE OF CARBOHYDRATE TO PROTEIN IN OVALBUMIN. *F. R. Jevons, Nature* **181**, 1346-7 (1958); *Chem. Abst.*,

52, 20287 (1958). A product similar to that of Neuberger was prepared by treating ovalbumin (3-5 times crystalised either native or heat-denatured) with a crude pancreatic extract. After deproteinisation with 5% trichloroacetic acid and removal of the reagent by repeated extraction with ether, the solution was passed through a column of the sulfonated ion-exchange resin Dowex 50 in the H^+ form to remove most of the aminoacids and peptides. The unabsorbed material was submitted to paper electrophoresis in 0·05*N* NH_4CAc. Experiments with the eluates gave no evidence for the existence of a O-glucosidic link. Results would be consistent with a combination of an amino-carboxyl group with glucosamine, but the direct evidence for such a bond is lacking.

THE INFLUENCE EXERTED UPON COLLAGEN-MUCOPOLY SACCHARIDE COMBINATIONS BY SEVERAL POLYPEPTIDES. A FUNCTION OF THEIR NEUTRAL OR BASIC CHARACTER. *Suzanne Bazin and Albert Delaunay. Compt. rend.* **246**, 2190-3 (1958); *Chem. Abst.* **52**, 20288 (1958). The collagen A used contained 0·8 mg. of protein/ml. of solution prepared at a pH of 4·3. The mucopolysaccharides (MP) used were heparin and chondroitin sulfuric acid. The polypeptides utilized were: (a) glycylglycine and diglycylglycine, (b) nondialyzable polypeptides, (c) protamine sulfate very strongly basic and having a relatively low molecular weight, (d) a lysozyme of higher molecular weight and less basic, and (e) basic peptides from pork spleen. The nature of the precipitate and its behaviour when exposed to heat is given for the collagen mixture with each polypeptide and the 2 mucopolysaccharides. The small neutral polypeptides influence the collagen-MP combination. The high molecular weight polypeptides inhibit precipitation, and the basic polypeptides can modify or inhibit the collagen-MP combination.

FORMATION OF COLLAGEN. III. TIME-DEPENDENT SOLUBILITY CHANGES OF COLLAGEN IN VITRO. *Jerome Gross. J. Exptl. Med.* **108**, 215-26 (1958). *Chem. Abst.* **52**, 20305 (1958). Solubility changes of cold neutral salt solutions of collagen extracted from calf and guinea-pig skin were studied *in vitro*, and a possible explanation offered for changes in collagen extractibility and solubility associated with growth and aging. Collagen preparations incubated at 37° showed a gelation (or precipitation) which was reversable on cooling to 2°; with increased time of incubation there was a steady diminution in degree of reversability. A lower rate of conversion to the insoluble form (i.e. a

higher degree of reversibility) at 37° was shown by highly purified collagen and by hypertonic extracts. Solubility of collagen gel in cold citrate, pH 3·5, decreased with increasing time of previous incubation.

MECHANISM OF PROTEIN DENATURATION. EFFECT OF FORMALDEHYDE AND ETHER ON THE STABILITY OF GLOBULAR PROTEINS TOWARD DENATURATION. *A. S. Tsyperovich. Voprosy Med. Khim.* **2**, 169-74 (1956); *Chem. Abst.* **52**, 20282, (1958). HCHO, 0·12-0·4%, does not affect the stability of egg albumin, i.e., does not change stability of its macromolecular structure toward denaturation. HCHO affects postdenaturation reactions, and as a result albumin does not precipitate from solution and does not gel. HCHO, 8-18%, becomes a denaturing agent. Addition of ether (6-6·5%) to aqueous solution of protein sharply decreases the stability of egg albumin.

COLLAGEN - MUCOPOLYSACCHARIDE COMPLEXES AND THEIR IMPORTANCE IN BIOLOGY. *Albert Delaunay and Suzanne Bazin. Bull Soc. Franc. Dermatol. Syphilig.* **64**, 534-45 (1957); *Chem. Abst.* **52**, 20283, (1958). Between pH 1·5 and 10 addition of heparin to solutions of collagen (*I*) produces fibrous precipitates which redissolve upon addition of 0·6 *M* $CaCl_2$. The stoichiometric composition of the complex is constant over wide ranges of heparin concentration but is dependent upon pH; at pH 4·3 and 6·0 the hexosamine/hydroxyproline ratio is 0·222 and 0·153 respectively. The linkage appears to be ionic in nature. Over the same pH range hyaluronic acid and chondroitin sulfate also form insoluble complexes with *I*. However, these complexes do not have a constant composition with respect to mucopolysaccharide (*II*) concentration, are soluble in 0·05*M* $CaCl_2$, and appear to involve H bonds as well as ionic ones. Formation of complexes between *I* and *II* in the presence of streptococcal, staphylococcal, pneumococcal, and salmonella polysaccharides resulted frequently in abnormally short or disaggregated fibres. It is suggested that in connective tissue diseases interactions between *I* and *II* may be defective, possibly owing to the competitive activity of bacterial products or autoantibodies.

THERMAL CONTRACTION OF SINGLE TENDON FIBRES FROM ANIMALS OF DIFFERENT AGE AFTER TREATMENT WITH FORMALDEHYDE, URETHAN, GLYCEROL, ACETIC ACID AND OTHER SUBSTANCES. *F. Verzar and K. Huber.*

Gerontologia **2**, 81-103 (1958); *Chem. Abst.* **52**, 20285 (1958). Changes in thermal contraction of single tendon fibres (collagen fibres) from the rat's tail are described. The maximum weight or half-maximum weight which inhibits thermal contraction might be used as a measure of the age of the animal. A discussion is presented of the interrelation of the variables, age, weight, temperature of maximum contraction and temperature of incipient contraction with the time of contraction and elasticity. It has been found that HCHO and *p*-quinone increase cross-linkages, increase the contraction temperature, and the maximum weight which inhibits contraction. Urea and urethan have the opposite effect. They decrease the contraction temperature but have only a slight delaying influence on the maximum weight. EtOH and glycerol reversibly inhibit thermal contraction. AcOH by decreasing contraction temperature, enhances contraction. Its action on the helical structures and its reversibility are discussed. The results of this study are discussed on the basis of the theory that polypeptide chains connected with mucoproteins form the macromolecules of collagen. Cross-linkages between these must be different from those between the polypeptide chains, which increase with aging.

INFLUENCE OF TANNINS ON THE DEGRADATION OF PECTIN BY PECTINASE ENZYMES. *D. E. Hathway and J. W. T. Seakins. Biochem. J.* **70**, 158-63 (1958); *Chem. Abst.* **52**, 20278 (1958). Pectolysis of low methoxy pectin by commercial enzyme preparations leads to a series of oligo-galacturonic acid (*I*) intermediates up to the decamer, and eventually to D-galacturonic and (*II*) whereas the enzymic hydrolysis of pectin affords *II* alone. The encountered pectolytic actions of these enzyme preparations may be explained in terms of endopolygalacturonase (endo-PG), exopolygalacturonase (exo-PG) and exopolymethylgalacturonase (exo-PMG). Endo-PG attacks low-methoxy pectin by a random mechanism of hydrolysis which leads to intermediate *I* and eventually to digalacturonic acid (*III*) whereas exo-PG removes terminal galacturonic units from the substrate and its intermediate polyuronides, and cleaves *III*. Exo-PMG attacks pectin by a terminal mechanism of hydrolysis. Viscometric measurement shows that myrobalans tannins exert a powerful inactivation on early stages of pectolysis of low-methoxy pectin, but only a slight retarding action on the pectolysis of pectin. The fact that these enzymic hydrolyses go to completion in the presence of myrobalans tannins is consistent with the ripening of the fruit. Gambir tannin has no effect on the pectolytic actions investigated.

LIPASE OF OIL-BEARING PLANTS. *A. A. Prokof'ev and G. V. Novitskaya. Biokkimiya* **23**, 612-15 (1958); *Chem. Abst.*, **52**, 20438 (1958). Results of a study of lipase activity (*I*) of seeds of poppy, flax, and sunflower showed the intensity of *I* depended on the physiological state of the seeds and on the pH. Lipase of dormant and ripening seeds had two pH optima, 4·0—5·0 and 8·0—10·0 and lipase of sprouting seeds had just one optimum, pH 5·0. Lipase preparations of any of the seeds studied hydrolyzed glycerides of different oils, which indicated that the lipases studied were devoid of any substrate specificity. The hydrolysis of ethyl and butyl acetates during the lipase tests points to two possibilities; the seeds contained additional active esterases or the lipase had the capability of hydrolyzing esters of lower acids. Glutathione, cysteine, and ascorbic acid markedly activated the lipases under study; KCN and NaF inhibited their enzymic activity.

SPECIFICITY OF COLLAGENASE. *Susan Michaels, Paul M. Gallop, Sam Seifter, and Edward Meilman, Biochem et Biophys. Acta* **29**, 450-1 (1958) (in English); *Chem. Abst.* **52**, 20311, (1958). The specificity of purified *clostridium histolyticum* collagenase (*I*) was investigated. *I* was inactive towards various synthetic di-and tripeptides, amino-acid esters, casein and other proteins, etc. The end products resulting from the incubation of *I* with fish collagen or calf procollagen or with the gelatins derived from these had an average molecular weight of about 500. *I* acted on collagen to release only N-terminal glycine. Discounting N-terminal glycine present before hydrolysis, *I* appeared to hydrolyze about 60% of the peptide bonds involving glycine, with little regard to the nature of the preceding amino-acid residue. Evidence was obtained indicating that *I* did not cause the release of C-terminal glycine.

RABBIT HAIRS. XVIII. FRICTIONAL PROPERTIES OF ANGORA RABBIT HAIRS IN WATER. *Sakio Ikeda, Saburo Okajima, and Teruo Inoue. Sen-i Gakkaishi* **14**, 15-20 (1958); *Chem. Abst.* **52**, 21190 (1958). In order to observe the frictional properties of Angora rabbit hairs in water by means of the inclined-hair method, an appratus was devised and a preliminary test was made; the weight and the diameter of the Pt rider used were 14·2 mg. and 0·3 mg. respectively. Frictional coeffs. increased when the hairs are degreased with CCl_4. The effect of the thickness of

fur on the frictional coefficient was negligible. In the narrower range of a hair surface, the apparatus can give a definite value.

RABBIT HAIRS. XIX. Effect of carrotting conditions upon the weight increase of the carroted fur. *Sakio Ikeda and Saburo Okajima. Sen-i Gakkaishi* **14**, 175-82 (1958); *Chem. Abst.*, **52**, 21191 (1958). Since the weight of the fur increases during carrotting, the effect of each factor was examined under the following conditions: 0·5-4·5% Hg $(NO_3)_2$; temperature 20-60°; 1·0—5·0% HNO_3, 5-85 min., 0·1-0·5% $NaNO_2$. The experiments were designed by means of 5 × 5 hyper Graeco-Lation Square and L_{27} (3^{13}). The weight increase of the sample fur was determined after carrotting (immersing, squeezing by centrifuge, and drying at 95° for 30 min.), washing, and drying at 95° to constant weight. Results: The weight increases linearly with concentrations of HNO_3 and $NaNO_2$ and the immersion time and quadratically as the immersing temperature increases. Hg. $(NO_3)_2$ (0·5-4·5%) has little effect upon the weight increase at the 5% level.

MILDEW CONTROL IN THE TANNING INDUSTRY. *K. Bassalik and E. Niepokojczycka. Prace Inst. Przemyslu Skórzanego* **2**, 3-20 (1956); *Chem. Abst.* **52**, 21192 (1958). *o*-PhC_6H_4OH (*I*) and (or) Na *p*-chlorophenoxide (*II*) were added (0·003-0·1%) to vegetable liquors to control mildew. *II* proved inferior to *I*. *I-II* (1:1) mixture or *I*, added in 0·05—0·1% to Russian (*III*), harness (*IV*) or sole leathers, was most effective. *III* proved least, and *IV* most resistant to mildew in 1-month experiment. Soaking in, or rubbing of finished leathers on the flesh side with 0·1% aqueous solution of *I* or *II*, was also effective, if followed by storing the leathers at temperatures of up to 20° and relative air humdity of 50-60%. Preservatives currently used are reviewed.

CATIONIC AND NONIONIC EMULSIFIERS FOR LEATHER RETANNING COMPOSITIONS. *Farbenfabriken Bayer A-G.* **Brit. 793,603**, Apr. 16, 1958. *Chem. Abst.* **52**, 21195, (1958). Neutralized chrome-tanned cow-hide (100) parts is drummed with a mixture containing 26·3 parts of a 38% copolymer emulsion (made from dichloroethane, Bu acrylate, and a polyglycol emulsifer) and 5·9 parts of a 56% tanning agent of the arylsulfonic acid-HCHO condensation type (Fr. 897,222) in 16 parts water. The final leather has a reduced water absorption by the Kubelka-Nemec method. Other cationic or nonionic emulsifiers may be used, as well as other synthetic and vegetable tanning materials.

MULTIFUNCTIONAL URETHAN-HCHO condensates for tannage. *Badische Anilin — & Soda-Fabrik Akt.-Ges.* **Brit 796,905.** *June* 18, 1958; *Chem. Abst.* **52**, 21195 (1958). Limed, unhaired, and bated calfskin is treated for 2 days at 20° with 5 times its weight of a liquor containing 45 g./l of a condensation product of 2 moles HCHO and 1 mole of 1, 4-butanediurethan. and 0·33 g. Na_2CO_3. The wrung stock is dried for 3 hrs. at 70°; the resulting leather is very firm, pale in color, and has a shrinkage temperature of 90°. Urea (2·5-5% by weight of the hydroxymethyl urethan) added to the tanning liquor gives a more compact and firm leather.

RETANNAGE OF MINERAL-TANNED LEATHER WITH RESORCINOL AND FORMALDEHYDE. *Douglas K. Severn.* **U.S. 2,840,445**, *June* 24, 1958; *Chem. Abst.* **52**, 21195 (1958). The process described improves the shrinkage temperature and mellowness of the leather. The process is particularly useful for hair-on leather, yielding a silkier appearance and better adherence. An example describes the retannage of 360 lb. chrome-tanned hair-on bellies which have been split and shaved to 5-oz. weight. The pack is rinsed and warmed to 130°F and then drained. Resorcinol (9 lbs.) is added and drumming continued for 45 minutes; HCHO is then added as a mixture of 9lb. paraformaldehyde and 4·5 lb. Na_2CO_3. After 2·5 hours of drumming, the pH is 6·5—7·0 and the drum liquor does not give a red precipitate when concentrated H_2SO_4 is added. When the end point is attained, the drum contents are rinsed at 120-30°F, and the stock is then fatliquored. This retannage increases the shrinkage temperature so that the leather withstands a 5 minute boil and also increases the fullness and mellowness of the leather. The amount of resorcinol used should be 2-5 % of the wrung weight of the tanned stock. HCHO should be used in an amount of 1·5-3·0 moles/mole of resorcinol. The pH is controlled with Na_2CO_3, MgO, $NaHCO_3$ or K_2CO_3.

STRENGTHENING OF LEATHER BY SYNTHETIC RESIN. *Toshiyasu Inoue. Japan.* 4447 ('58) *June* 5; *Chem. Abst.* **52**, 21193 (1958). Tanned leather is soaked in a mixture of MeOH, AcOH and C_6H_6 (89: 1: 10) at 60° for 1 hour, dried, soaked in a mixture of vinyl acetate, vinyl stearate, and Bz_2O_2 (89·5: 10: 0·5) for 3 hours at 20°, dried, heated with 5 % NaCl solution at 60-5° for 7 hours and washed with solvent to give strengthened leather.

SYMPOSIUM ON 'UTILISATION OF BY-PRODUCTS OF THE LEATHER INDUSTRY'

The fifth in the series of the Symposia will be held at the Central Leather Research Institute in February, 1960. The subject for the forthcoming symposium is *Utilisation of By-products of the Leather Industry.*

Nothing is a waste. There is hardly anything for which research and industry cannot find a use. More often than not, profits of any industry depend, to a great extent, on how best the wastes are utilised. In the conversion of putrescible raw hide or skin into leather that is resistent to heat, hydrolysis and bacteria, the hide or skin undergoes a number of wet and dry operations. A variety of by-products are obtained during these. The successful utilisation of these by-products depends upon the plant output, efficient collection and handling methods.

The tannery effluents from the operations of soaking, liming, unhairing, bating etc., containing large quantities of suspended nitrogenous matter are to a great extent profitably utilised as fertilisers. The lime sludge could be used in making heating briquettes and also for stabilisation of certain soils. The coagulable proteins from the curing brine are suitable substitutes for casein. The skin trimmings and waste fleshings are ideal raw materials for the manufacture of high quality photographic and edible gelatin as well as glue and for the manufacture of sausage casings. The hair is used in making felt and such other products. A certain amount of tannins can be recovered and the spent tan barks used as fuel, to cover the tracks in the race course and in the manufacture of boards and white lead. The sludge from the tan pits is used as fuel and in reducing bichromate in the manufacture of basic chrome liquors. The other types of wastes are leather trimmings, shavings, and leather dust, which could be utilised for the manufacture of fertilisers, glue, leather boards and fancy articles.

The leather industry should be also keenly interested, though indirectly, in the effective utilisation of the animal carcass by-products. The basic raw material for the tanner (raw hide) is after all the by-product of agriculture and meat industry. This is a major problem, particularly in India, where organised slaughter

APPENDIX-B

Particulars to be furnished by those intending to participate in the Symposium

1. Name & full address of the Organization/Office:
2. Name (s) of Delegate (s) & full address:
3. Title of paper (s):
4. Is accommodation in Madras to be reserved for you:
5. Are you interested in visiting tanneries in and around Madras:
6. Any other request or suggestion not covered above:

NOTES & NEWS

EXECUTIVE COUNCIL OF C.L.R.I.

In accordance with the decision of the Governing Body of the Council of Scientific & Industrial Research, the President, C.S.I.R. has reconstituted the Executive Council of the Central Leather Research Institute for a period of three years with effect from April 1st, 1959.

1. Dr. A. Lakshmanaswami Mudaliar, Vice-Chancellor, Madras University, Madras-5—*Chairman.*
2. Shri P. R. Sondhi, Manager, Kapurthala Northern India Tanneries Ltd., Kapurthala (Punjab)—*Member.*
3. Shri S. P. Pandit, Western India Tanneries Ltd., Dharavi, Bombay-17.—*Member.*
4. Dr. T. R. Govindachari, Professor of Chemistry, Presidency College, Madras-5—*Member.*
5. Shri Moni Banerjee, Superintendent, College of Leather Technology, Canal South Road, P.O. Tangra, Calcutta-15—*Member.*
6. Shri Sanjoy Sen, M/s. National Tannery Co. Ltd., Mercantile Buildings (3rd Floor), Lal Bazar St., Calcutta.—*Member.*
7. Mohamed Yaqub Esq., Director, Indian National Tannery (P) Ltd., Jajmau, Kanpur (Representative of the Tanners Federation of India, Kanpur (U.P.)—*Member.*
8. Shri M. K. Bhagwat, Modern Tanners' Co-operative Society Ltd., 220, Dharavi Road, Bombay-17. (Representative of Leather Goods Manufacturers' and Dealers' Association, Bombay)—*Member.*
9. Development Commissioner (Leather), Small Scale Industries, Ministry of Commerce & Industry, Shahjahan Road Hutments, New Delhi.—*Member.*
10. Dr. A. Seetharamiah, Development Officer (Leather), Development Wing, Ministry of Commerce & Industry, Udyog Bhavan, New Delhi.—*Member.*

11. Janab A. A. Rasheed Sahib, M.A., 11-A, Sydenhams Road, Madras-3. (Representative of the Southern India Skin and Hide Merchants' Association, Madras).—*Member.*
12. Janab M. J. Jamal Moideen Sahib, M.L.A., 16, Thambu Chetty St., Madras-1.—*Member.*
13. Mr. A. J. Sharman, M/s. Gordon Wodroffe Leather Manufacture Co. P. Ltd., Pallavaram.—*Member.*
14. Director-General, Scientific & Industrial Research, Old Mill Road, New Delhi.—*Ex-officio Member.*
15. Financial Adviser to Council of Scientific & Industrial Research, Old Mill Road, New Delhi-1.—*Ex-officio Member.*
16. Director, Central Leather Research Institute, Madras-20. —*Ex-officio Member.*

WATER FOR LAND BOILERS

A Code of Practice Drafted

There are two sides to a boiler; the fire side and the water side. Usually, much care is expended on keeping the fire side free from accumulations of deposits that would tend to interfere with adequate heat transfer. However, in spite of simplicity and certainty of many forms of modern water treatment, in many of the lower pressure boilers little attempt is made to keep the water side free from deposits. Scale on the water side can be far more dangerous than deposits on the fire side, and can result in over heating of the metal with consequent failure with the risk of explosion.

With a view to lay down conditions to be aimed at in boiler feed water and boiler water for overcoming the troubles experienced on the water side of the boilers, the Indian Standards Institution had drafted a code of practice for Water for Land Boilers [Doc: CDC 26 (911)]. This standard deals with the conditions to be aimed at in water for boilers to overcome the troubles experienced in the water side of boilers, generally operating below 17·5 kg per sq cm (or 250 psi) pressure. Copies of the draft standards are available, free on request, from the ISI Headquarters at New Delhi, or from its Branch Offices at Calcutta, Bombay and Madras.

ONE-MARK GRADUATED FLASKS

Graduated flasks are used both in industries and in scientific laboratories for preparation of solutions of required strengths for

specific uses. With a view to prescribing the requirements and methods of test for such graduated flasks, the Indian Standards Institution has published an Indian Standard specification for One-Mark Graduated Flasks (IS: 915-1958).

This standard prescribes two series of tolerances on the capacity of graduated flasks, namely Class A and Class B. The Class A has been laid down to meet the requirements of standard solutions, used in scientific laboratories, and which are of a reasonably high accuracy. The Class B is designed to have an accuracy suitable for general purposes.

Copies of the standard, published in English and priced at Rs. 1-50 each, are available from the offices of the Indian Standards Institution, located at New Delhi, Bombay, Calcutta and Madras.

COMMON SALT FOR ANIMAL CONSUMPTION

An Indian Standard Issued

In India common salt for cattle has been produced from various sources. Owing to diversity of sources and variations in the practice of manufacture and storage, there exists a considerable variation in the quality of salt. Presently, the crude salt is produced by evaporating sea water and is used for animal consumption. In a country where agriculture forms a major occupation of the people, the cattle wealth cannot be easily ignored. Even the Estimates Committee of the Lok Sabha had felt that the quality of salt for animal consumption could be improved if some standards were laid down, and that such standards would also help in the progressive upgrading of the output of the material produced in the country. With a view to meet the need for a standard on the subject, the ISI has issued a Specification for Common Salt for Animal Consumption (IS: 920-1958).

This standard prescribes the requirements and methods of test for common salt for animal consumption.

The standard is published in English and priced at Rs. 1·00. Copies are available from the offices of the Indian Standards Institution, located at New Delhi, Bombay, Calcutta and Madras.

LIFMA ENTERTAINS TRADE DELEGATION FROM INDIA

Leather Importers Factors and Merchants' Association on Friday, last week, entertained to tea at the Hyde Park Hotel a delegation sponsored by the Federation of Indian Chamber of Commerce and Industry.

The delegation, which is on a world-wide tour, included Mr. T. Abdul Wahid, Mr. A. Nagappan, Mr. T. M. Jejurikar and Mr. S. Krishnamurti, First Secretary (Commercial) and Commercial Counsellor respectively from India House.

In response to words of welcome addressed to the Indian delegation by Mr. C. L. Yelland, Chairman of the Council, Mr. Wahid stressed the friendly situation which had subsisted between the exporters of E.I. tanned hides and skins in Madras and the importers in the U.K., not just for a few years but over a whole century and expressed the hope that this would long continue.

He also said that if prices could be substantially maintained at present levels the users of E.I. tanned kips in this country could be assured of good supplies.

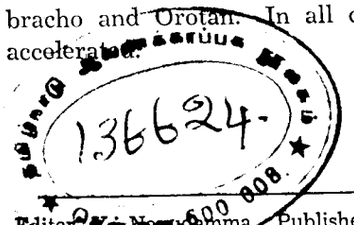
—*Leather Trades Review*: 13-5-1959.

NEW U.S. RAPID TANNING PROCESS

The heavy leather industry's dependence on imported vegetable tanning extracts may be greatly reduced or eliminated by a new and rapid tanning process which uses domestically abundant aldehydes, according to a report of Army research just released to the public through the Office of Technical Services, U. S. Department of Commerce.

The process reportedly avoids any danger of drawn or cracked grain, the main objection in the past to tanning with aldehydes. The author states that even the heaviest steer bend can be fully tanned overnight by this process. The end products are said to be indistinguishable from vegetable-tanned leathers.

Particular success was noted with formaldehyde, glyoxal and glutaraldehyde, three aldehydes available in almost unlimited quantities. Experiments with aldehydes included their use in combinations with chrome, zirconium and vegetable tannages. Tests were also made with blends of spruce abstracts with quebracho and Orotan. In all cases, penetration and pick-up were accelerated.



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