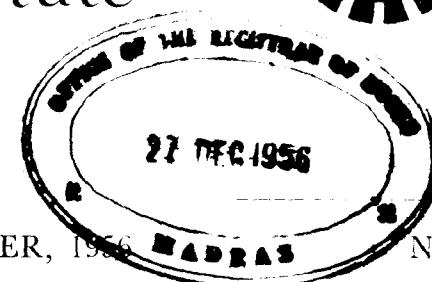


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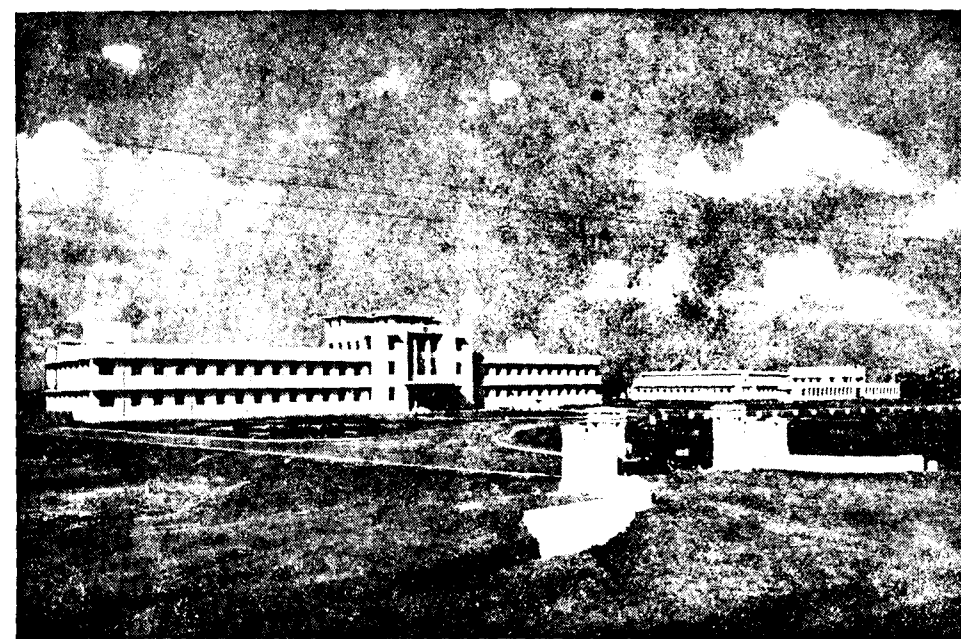
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Bulletin of The Central Leather Research Institute



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TRIBUTES TO LATE PROF. B. M. DAS

"Have learnt with deepest shock sudden tragic demise of Prof. Das. Lost a friend in him. Have requested Secretary to be at Madras to-day. My wife and I convey our heartfelt condolence and join Mrs. Das in her bereavement. Pray God his soul rest in peace."

—Prof. Thacker, Director-General, Scientific & Industrial
Research, New Delhi.

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"Dr. Lahiri and staff of Fuel Research Institute mourn the loss of Prof. Das. Kindly convey condolence to his bereaved family."

—Fuel Research Institute, Jelgora.

"Three scores and ten; and Prof. B. M. Das is no more. But the wonder is he lived so long; for only his indomitable spirit and indefatigable industry could battle against formidable odds that shattered his health; and preserved him to the end of his life at the post of duty, at the altar of Leather Research in India. And he brought renown to himself and to his Institution—Central Leather Research Institute, Madras. By qualities of head, he endeavoured to keep high our tanning industry in the research map of India, an industry which is, despite difficulties, living and growing, and earning for the nation Rs. 250 millions of foreign exchange every year, so valuable for the success of five-year plans. By qualities of heart, he endeared himself too deep in the affections of the Captains of our Industry, for only a gentleman par excellence could understand their limitations and extend his healing touch to their myriad problems. Therefore, it is the gentleman in Prof. B. M. Das no less than the expert in him that we miss to-day."

—N. M. Anwar, Hony. Secretary, Southern India Skin
and Hide Merchants' Association, Madras.

"There were many occasions on which many of us had the opportunity of seeing Prof. B. M. Das at close quarters and his enthusiasm for work even at that old age impressed one and all.

He created history when he arranged the first symposium on East India Tanning Industry and Tanning Agents in which authorities of international repute took part in July 1955 and the credit of its great success goes only to him. The grand lecture of modern tanning he gave at the office of our Association on 26-2-1956 is still afresh in our memories and every tanner here heartily appreciated his ambition to pull up this cottage industry. Truly, the research work he carried out for the development and progress of the Indian Tanning Industry has raised the status of the Central Leather Research Institute to that of other international institutes. Had Providence spared him a few more years he would have seen for himself the successful completion of his life-long mission and the tanning industry would have acquired many more tanning techniques. His death is an irreparable loss to every tanner. May his soul rest in eternal peace."

—K. Mohamed Obaidullah, General Secretary, Vaniyambadi Tanners' Association, Vaniyambadi.

"His death is a great loss to the leather manufacturers and also to the growing Institute. Please arrange to convey my condolence to the bereaved family."

—N.T.S. Mudaliar, N. M. Tannery, Tiruchirapally.

"Please accept on our behalf as also on behalf of the Tanner and convey to the members of his family, our heartfelt sympathies for their sad bereavement."

—Miss Meena Raja, 'Tanner,' Bombay.

"From my observations of the most well-planned and well-staffed laboratories of the Central Leather Research Institute and the very useful work accomplished by it within a short time of its life as well as its future plans of work, I am one with other personal friends of Prof. Das that he was a pioneer and a great scientific worker in the field of leather tanning in India. Your Institute and the country are certainly poor without his physical services. The only satisfaction to us is that the foundations of the Leather Research Institute have been well laid by him and I am

sure the late Prof. Das's work shall not only be kept going as planned by you and your other associates but shall further be pushed forward in all possible directions as a living monument to his great memory."

—Mr. K. L. Aggarwal, President, Forest Research Institute & Colleges, P.O. New Forest, Dehra Dun.

"We have lost a beloved friend and guide and India has lost a great personality in leather industry by the death of Shri B. M. Das. My condolence to yourself and colleagues and to the bereaved family."

—Mr. Satishchandra Dasgupta, Member in charge, Match and Leather Industry, A.I.K. & V.I. Board, Bombay.

"Staff and students of Bengal Tanning Institute deeply mourn the sudden demise of Prof. B. M. Das and send their heartfelt condolence to his bereaved family."

—Superintendent, Bengal Tanning Institute, Calcutta.

"His work in the field of leather technology is recognised throughout the world and will remain as a permanent monument of particular value to the Indian leather trade, in whose interests he has been so active throughout his life."

—A. Harvey, Hon. General Secretary, International Union of Leather Chemists Societies, Croydon, Surrey.

"This irreparable loss to your Research Institute and to the Leather Industry of your country is keenly felt in France, where Prof. Das's personality has earned great repute."

—C.H. Gastellu, Association Francaise Des Chimistes Des industries Du cuir, Lyon.

"I realise that through his unfortunate death the Indian Leather Industry has lost a well-liked and respected personality as well as a very gifted scientist."

—R. G. Mitton, President, Society of Leather Trades' Chemists, Egham, Surrey, England.

"Turner Tanning Machinery Company, Leeds and Randall & Hardcastle, Salisbury join in sending expressions of deep regret hearing news of the death of B. M. Das. Please convey sincere condolences to relatives and accept assurance of our sympathy in your loss.

—Tudball, Managing Director, Turner Tanning Machinery Company, Bramley, Leeds (England).

"May I take this opportunity of expressing our deep sympathy on the heavy loss the Indian leather trade has suffered by Prof. B. M. Das's death.

—The Leather Trades' Review, London.

"I regret immensely that Professor Das is no more. He was such an impressing and well instructed personality who has done a great deal for his country, the Indian tanning trade and the organisation of the East Indian Hide Trade, and it appears to me that he was the best instructed personality about all Hindustan hide, skin and leather questions. All gentlemen visiting us from Hindustan or from Pakistan spoke with greatest respect of their leading man, Professor Das."

—Walter Freudenberg C/o Carl Freudenberg,
Weinheim/Bergstr.

"With sorrow learned Professor Das demise. Tanners world over will miss his advice. Please convey condolences his family."

—Martin, Boston, Mass.

"Prof. Das has been associated with the leather tanning industries for many years past and his services in this direction are unforgettable."

—Western India Tanneries Ltd., Bombay 17.

Messages were also received from the Govt. Tanning School, Fatehpur (U.P.), Asst. Editor, Association Quimica Espanola de la Industria del Cuero, Barcelona, Amba Tannin & Pharmaceuticals (Private) Ltd., Kolhapur, the Tanning Industries (Private) Ltd., Madras Branch, Footwear, London, Buckingham & Carnatic Co., Ltd., Madras, the South Indian Export Company Ltd., Madras, Rallis India Ltd., Madras, Central Scientific Supplies Co., Ltd., Tambaram, the Hyderabad Tanneries Ltd., Hyderabad, Leather Goods Manufacturers' and Dealers' Association, Bombay, Messrs. N. Mohamed Mian Rowther Company, Tiruchirapalli and Mr. K. V. V. Lingham of the Skins and Leathers Ltd., Coimbatore.

EFFECT OF ACID AND SALT ADJUSTMENT IN E. I TANNAGE WITH *PITHECOLOBIUM DULCE*

M. K. UDAYA VARMA, E. C. MATHEW AND
B. M. DAS.

SUMMARY

E. I. tanning experiments using *Pithecolobium dulce* bark have been carried out with various quantities of sodium sulphate, sodium formate and sodium lactate. It was found that sodium sulphate and sodium lactate effect a slight improvement in colour. The feel was firmer and the yield was better with all the three salts tried.

Pithecolobium dulce bark, by itself gives a slightly dark coloured leather with a soft feel.¹ To make this bark suitable for the production of E.I. kips, experiments were carried out in which the acid and salt contents of the tanning liquors were varied. The tanning liquors used in the experiments were obtained by leaching the tanning material.

Experimental: The butt portion of wet salted cow hide was limed and delimed as for E.I. tanning and pieces of approximately 7" x 3" were cut for the experiments. The pelt was divided in such a way as to avoid discrepancies in results due to pelt variations. The tanliquor was prepared by leaching crushed pithecolobium dulce bark overnight. The liquor was adjusted to 15°BK. The pH of the liquor was 5.3. 700 cc. of the tan liquor were taken in each of 10 battery jars. Weights approximately corresponding to the following equivalents of salts were added to the tanliquors and well stirred.

Expt.	I	No salt added.
"	II	40 mgm. eqvt. of sodium sulphate per litre
"	III	100 mgm. eqvt. of sodium sulphate per litre
"	IV	150 mgm. eqvt. of sodium sulphate per litre
"	V	40 mgm. eqvt. of sodium formate per litre
"	VI	100 mgm. eqvt. of sodium formate per litre
"	VII	120 mgm. eqvt. of sodium formate per litre
"	VIII	25 mgm. eqvt. of sodium lactate per litre
"	IX	75 mgm. eqvt. of sodium lactate per litre
"	X	100 mgm. eqvt. of sodium lactate per litre

The pH values of all the liquors were then adjusted to 5.0 with lactic acid. The free acid, total salts and salts of weak acids in the liquor were determined (Table I) and the pelt put in. The liquor pelt ratio was 7:1. Pelts were handled daily, examined on the fifth day and when on the fourteenth day the tanning was complete, bleached with a solution containing perfectan 0 and oxalic acid (2:1) and then put in myrobalam liquor of 20°BK. On the 16th day, they were oiled with groundnut oil and dried. The liquors after tannage were analysed (Table II).

TABLE I.
Analysis of the liquors at the commencement of tanning.

	I	II	III	IV	V	VI	VII	VIII	IX	X
Tannins (gms./litre)	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75
Nontans (gms./litre)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
°BK	15°	15°	15°	15°	15°	15°	15°	15°	15°	15°
pH	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Acidity to pH 5.8 (mgm. eqvt. per litre)	10.5	11.0	11.0	11.4	15.3	18.4	26	15.4	20	19.9
Total Salts (Sulphated ash method) mgm. eqvt. per litre	101.3	139.4	197.5	247.3	142.9	195.6	214.6	124.8	175.9	207.0
Salts of weak acids (titration to pH 2.0) mgm. eqvt. per litre	42.5	45.3	49.1	52.1	77.1	130	148.3	78.7	117.1	144.0
Salts of strong acids (Total salts- salts of weak acids)	58.8	94.1	148.4	195.2	65.8	65.6	66.3	46.1	58.8	63.0

TABLE II.
Analysis of liquors after tannage.

	I	II	III	IV	V	VI	VII	VIII	IX	X
Tannins (gms. per litre)	0.95	0.3	0.95	0.74	.96	0.11	0.64	0.37	1.85	0.99
Nontans (gms. per litre)	12.82	16.74	20.87	25.3	14.96	20.5	21.83	15.35	17.99	23.05
Acidity to pH 5.8 (mgm. eqvt. per litre)	—	—	—	—	—	—	—	—	—	—
Total salts (mgm. eqvts./litre)	108.4	153.3	223.6	272.0	151.6	207.4	241.6	142.0	179.1	218.7
Salts of weak acids (Titration to pH 2.0) mgm. eqvts. per litre	55.0	58.7	63.7	67.5	87.6	149.5	175	82.6	117.5	163.7
Salts of strong acids (total salts- salts of weak acids)	53.4	94.6	159.9	104.5	64.0	57.9	66.6	59.4	61.6	55.0

Observations after tanning for 5 days are as follows :
Penetration.

- I Complete.
- II Almost tanned through. No distinct line between tanned and untanned portions but a gradual diffusion of the tanning material.
- III Almost tanned through. No distinct line between tanned and untanned portions but a gradual diffusion of the tanning material.
- IV do
- V About 3/4 penetrated.
- VI Almost tanned through.
- VII Complete.
- VIII Complete.
- IX A thin streak of untanned portion in the centre.
- X do

Colour : There is no marked difference in colour.

Firmness : Leathers in experiments 2-10 were firmer than in Experiment I but no difference in firmness is observed on firmer than the others.

The tanning was complete in 14 days.

Chemical analysis of all the leathers were done and the results are given in Table III.

Sodium sulphate series :

There is not much difference in colour. Feel is firmer than in experiment I but no difference in firmness is observed on increasing the quantity of salt. There is no crack in any of the leathers whether without salt or with different proportions of salt either at single or double fold. Tearing strength is equal in all samples and is very high. From visual observations not much difference is noticed in the leather due to the addition of Na_2SO_4 and different proportions of it. A small addition (40 mgm. eqvt./litre) appears to lighten the colour and plump up the leather to a slight extent. This addition is helpful but any further increase in the quantity of sodium sulphate appears to be unnecessary in this respect. The yield of leathers increases definitely by the addition of salt and the increase is somewhat greater when the salt is increased from 40 to 100 mgm. eqvt. Since the ash percentage in these leathers do not show much difference, this

TABLE III.

	No salt added	Sodium sulphate series				Sodium formate series				Sodium lactate series			
		40 mgm. eqvts./litre	100 mgm. eqvts./litre	150 mgm. eqvts./litre	40 mgm. eqvts./litre	100 mgm. eqvts./litre	120 mgm. eqvts./litre	25 mgm. eqvts./litre	75 mgm. eqvts./litre	100 mgm. eqvts./litre	100 mgm. eqvts./litre	100 mgm. eqvts./litre	100 mgm. eqvts./litre
Moisture	12.97	13.34	13.17	13.49	13.67	13.34	13.76	13.38	13.08	13.27			
Oils & Fats	7.26	5.63	7.39	6.96	6.18	6.56	5.75	6.91	6.19	5.87			
Total ash	0.71	0.71	0.64	0.66	0.92	0.82	0.77	1.59	1.62	1.53			
Soluble ash	0.57	0.64	0.52	0.43	0.79	0.74	0.40	0.64	0.16	0.54			
Insoluble ash	0.14	0.07	0.12	0.23	0.13	0.08	0.37	0.95	1.46	0.99			
Water soluble matter	10.56	9.61	9.57	9.48	8.86	9.09	8.93	8.95	9.4	9.54			
Hide substance	39.85	41.88	41.27	41.57	41.2	40.88	42.56	41.71	40.92	41.75			
Fixed tans	29.22	29.47	28.48	28.27	29.96	30.05	28.63	28.1	28.95	28.56			
Degree of tannage	73.4	70.36	69.01	68.01	72.73	73.48	67.25	67.38	70.69	68.45			
pH of water solubles	2.8	2.9	2.8	2.8	2.9	2.95	2.9	2.95	2.95	2.9			
Shrinkage temperature °C	74	72	70	73	72	73	72	72	72	72			
Colour of Y -	2.0	2.5	2.0	2.5	22.5	2.0	2.5	2.0	2.5	2.5			
Leather R -	1.5	1.0	1.5	1.5	1.5	1.0	1.0	1.5	2.0	2.0			
Yield	63.8	66.3	69.1	68.4	68	65.1	63	65	64.0	66.0			

increase in yield cannot be considered as due to the functioning of the salt as an adulterant. So in respect of yield, addition of salt is useful. The shrinkage temperature decreases due to the addition of salt. The degree of tannage is also lowered. The water soluble matter in the leathers for which salt has been used is lower but the pH of water solubles is not much affected. On the whole the addition of sodium sulphate has some beneficial effects.

Sodium formate series :

There is not much improvement in colour due to the addition of sodium formate. Only in the case of addition of 40 mgm. eqvt. per litre, there is a slight lightening of the colour but when the amount of salt is increased to 100 and 120 mgm. eqvts. the improvement in colour disappears. Compared with similar leathers of the sodium sulphate series, the improvement in colour due to sodium sulphate is better in all cases than the sodium formate series. Tearing strength is very high in all cases. The feel becomes somewhat firmer due to the addition of sodium formate as was found to be the case with sodium sulphate also. But this firmness does not alter by increasing the proportion of salt. As regards yield the addition of 40 mgm. eqvts. causes the highest yield but any further addition successively lowers the yield. The shrinkage temperature is decreased due to the addition of salt. Water soluble matter is also decreased. There is not much difference in the degree of tannage when 40 and 100 mgm. eqvts. are added, but it is lowered on the addition of 120 mgm. eqvts. of salt, the pH of water solubles is slightly increased.

Sodium lactate series :

In this case there is a slight improvement in colour due to the addition of sodium lactate. The improvement is greater with 25 mgm. eqvts. but not so much with 75 or 100 mgm. eqvts. The feel is firmer due to the addition of sodium lactate. This firmness increases with the increase in the quantity of salt. This is unlike the leather of the sodium sulphate and sodium formate series in which there was no difference in firmness due to increase in salt addition. Tearing strength of all samples are good. The yield is also increased due to the addition of salt. The shrinkage temperature, degree of tannage and the water soluble matter are all decreased.

Chemistry & Physics Divn.
21-5-1956.

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1. M. K. Udaya Varma, E. C. Mathew & B. M. Das—C.L.R.I. Bulletin III, 1, 11, 1956.

THE USE OF ANTISEPTICS IN THE PROCESS OF SOAKING HIDES AND SKINS—PART I

Studies on Sodium pentachlorophenate

R. BHASKARAN, S. N. SEN AND B. M. DAS.

SUMMARY

The 'Inhibition Coefficient' or bacterio-static concentration of Sodium pentachlorophenate for a mixed culture of soak water bacteria was 0.050 to 0.075 gms. per cent. The method of determining the inhibition co-efficient has been modified to suit the requirements of tannery soaking conditions. The presence of hide piece lowers the inhibition co-efficient. The percentage concentration of sodium pentachlorophenate required for bacterial inhibition in soak waters is directly related to the temperature and duration of soaking within certain limits. A percentage concentration of 0.075 gms. per cent of sodium pentachlorophenate proved satisfactory as a bacterio-static at room temperature (Madras summer), in the soaking process.

Soaking is the first tannery process to which hides and skins are subjected to, and this involves the steeping of the cured hides and skins in water or in a solution of some chemical, till their original pliability and hydration are restored to them. The removal of the curing salt along with some albuminous interfibrillary substances, blood and dirt, are also accomplished by this process. The time required to hydrate the corium depends upon the condition of the skin (when put into the soak water), especially with regard to its moisture content and if the skin is greatly dehydrated the process has to be continued till a thorough soaking is obtained. Such a prolonged soaking without the help of other aids, in hot tropical climates, may cause enhanced bacterial activity, leading to considerable loss of hide substance and the consequent production of loose empty leather.

McLaughlin and Rockwell (1924) and Dempsey (1941) as a result of their studies on the factors influencing the activity of bacteria in soak water, stated that for successful soaking, one has to pay attention to the kind and amount of bacterial contamination of the hide, the temperature of soak, the pH and the time period of the soak, weight proportion of hide and soak water, type of soak (whether salts are present), gaseous environment of the soak and the adaptation of the bacteria to their environments. Bacterial putrefaction can be checked by reducing the soaking time, but this reduction in the duration of soaking is possible only

with wet salted ones while with the dry cured varieties the process has necessarily got to be prolonged, if the full purpose of soaking has to be accomplished. Such a prolonged soaking, however, cannot be hazarded, in most of the tanneries in this country which are on the scale of cottage industries, particularly during the summer months for fear of bacterial putrefaction in the soaking pits. The use of antiseptics to counteract such bacterial activity appears to be desirable. Recently the use of sodium pentachlorophenate is being advocated as a helpful bacteriostatic agent in many tannery processes. As such, its usefulness as an antiseptic in the usual process of soaking, has been taken up for study and the results so far obtained are being recorded here.

Determination of the inhibition coefficient of Sodium pentachlorophenate

This represents the lowest percentage concentration of the antiseptic that will inhibit bacterial growth in nutrient medium and was determined according to the method of Mackie and McCartney (1953). Sodium pentachlorophenate was added to broth medium and a series of test tubes containing serial dilutions of this antiseptic were prepared, the dilutions being 0.25, 0.10, 0.075, 0.050 and 0.025 gms. per cent respectively. A mixed flora of soak water bacteria containing a large number of different organisms served as the test inoculum. Since the antiseptic would be expected to act upon a multitude of different organisms usually present in soak waters, such a procedure was adopted. For this purpose soak water from four different tanneries from the suburbs of Madras and several samples from the tannery of our Institute were collected and cultured. The cultures thus obtained were pooled together and this mixed suspension of organisms was used for the test. A loop full of a 48 hour broth culture of these mixed organisms was added to each of these dilutions and the inoculated tubes were incubated for 48 hours at 37°C. One plain broth tube inoculated simultaneously served as the positive control. The tubes were examined at regular intervals for the presence of growth, and observations recorded. At the end of 48 hours one loopful from each of these dilutions was sub-cultured on agar slants to detect the presence of viable organisms. From this data the lowest percentage concentration of this antiseptic that completely inhibited the growth of organisms in broth, for a period of 48 hours was determined, this being the "Inhibition Coefficient".

A perusal of the Table I shows that at a percentage concentration of 0.25 and 0.10 gms., the antiseptic proved lethal to the organisms, as no growth was obtained on agar slant subcultures,

TABLE I.
Showing the Inhibition Coefficient of Sodium pentachlorophenate on a mixed suspension of soak water bacteria.

Culture particulars	Concentration of the antiseptic in broth					Control without antiseptic
	0.25 gms. %	0.10 gms. %	0.075 gms. %	0.050 gms. %	0.025 gms. %	
Presence of growth at the end of 48 hours incubation	-	-	-	-	+	+
Presence of growth on agar sub-cultures	-	-	+	+	+	+

Note.—The presence or absence of visible growth are indicated by + and — signs respectively.

form these dilutions. At a strength of 0.075 and 0.050 gms. per cent, the bacterial growth was completely inhibited, as the respective tubes remained completely clear, at the end of 48 hours, but agar sub-cultures from these resulted in growths, showing thereby that some viable organisms were still present in these dilutions. These strengths would therefore represent the "Inhibition Coefficient" of Sodium pentachlorophenate. Strengths below this did not inhibit the growth of organisms, in question.

It has been past experience that the presence of organic matter reduced the potency of antiseptics. Hides and skins being primarily organic in nature may act similarly and the study of the Inhibition coefficient in the presence of hide substance would therefore give information of a more practical value. Further the addition of the hide pieces to the antiseptic broth mixtures appears to have the following additional advantages. (1) The hide piece would increase the nutritive value of the test broth solution by adding to it such substances as are present on hide on which the bacteria thrive normally, (2) The addition of salted hide pieces would increase the salt concentration of the medium to some extent thereby favouring the development of brinophilic bacteria, (3) The concentration of the antiseptic producing bacteriostasis can be ascertained directly by noting progressive opacity in the culture tube due to bacterial growth and thereby obviating the need for resorting to laborious methods of counting (as in this case the presence of bacterial growth can be easily seen by the development of cloudiness in the test tube itself.)

The experimental procedure for this study remained the same as in the previous one, excepting that the inoculum in this case consisted of small pieces of wet salted hide, containing its own flora of bacteria. This served the double purpose of introducing the hide (organic matter) as well as the bacterial inoculum. The proportion of hide pieces to the antiseptic broth solution always remained as 1:4, i.e. the usual proportion between the hide and water in soaking.

TABLE II.
Showing the Inhibition Coefficient of Sodium pentachlorophenate in the presence of hide material.

Culture particulars	Concentration of the antiseptic in broth					Control without antiseptic
	0.25 gms. %	0.10 gms. %	0.075 gms. %	0.050 gms. %	0.025 gms. %	
Presence of growth at the end of 48 hours incubation at 37°C	-	-	-	+	+	+
Growth on agar sub-culture	-	+	+	+	+	++

Note.—The presence or absence of visible growth are indicated by + and — signs respectively.

From the data presented in Table II it is observed that visible bacterial growth was obtained even at a strength of 0.050 gms. per cent and the inhibition coefficient in this case ranged from 0.075 to 0.10 gms. percent of the antiseptic. It is thus evident that the activity of this antiseptic was lowered by the presence of hide pieces in the test broth as an increased amount of the antiseptic (when compared with previous experiment) i.e. 0.075 to 0.010 gms. percent of it was required to inhibit bacterial growth.

To study the effect of variations in soaking temperature on the bacteriostatic activity of this antiseptic, parallel inhibition coefficient determinations were made at different temperatures. While planning this experiment full credence was given to the natural bacteriological conditions that one encounters in a tannery. To simulate such conditions, only ordinarily cleaned (not sterilised) test tubes were used for this test and one loopful of a mixed culture of soak water organisms contained in a 24 hour broth

culture was added to each of the tubes. Only the broth solution added was sterile. The remaining part the experimental procedure was similar to the previous one. But the tubes were kept at 37°C (incubator) at room temperature (29-32°C) and at 20°C (Frigidaire) respectively. Observations were made at regular intervals for a period of 48 hours and recorded in Table III.

TABLE III.
Showing the Inhibition Coefficient of Sodium pentachlorophenate at different temperatures.

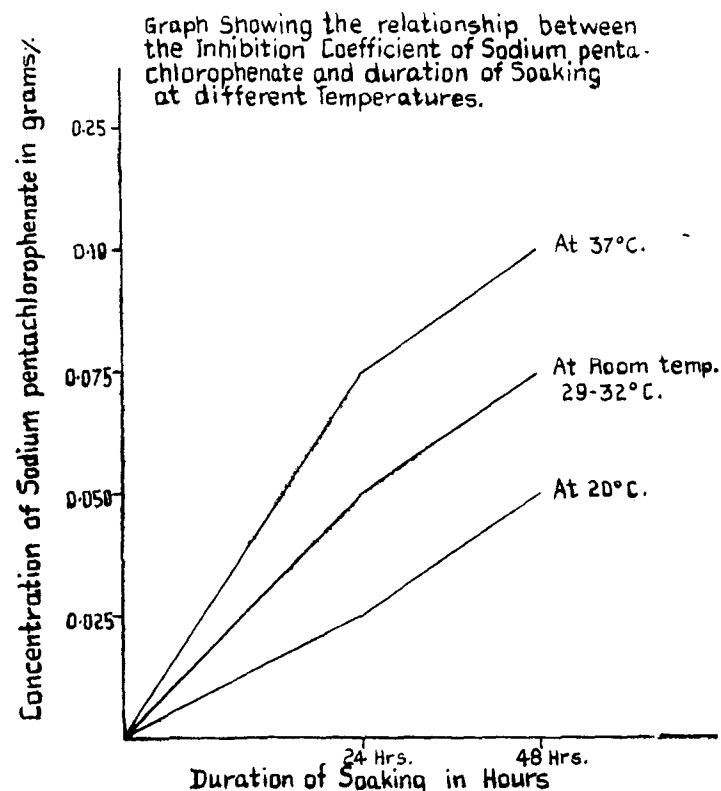
Temp. at which studied	Time in hours.	Concentration of the antiseptic					Control without antiseptic
		0.25 gms. %	0.10 gms. %	0.075 gms. %	0.050 gms. %	0.025 gms. %	
37°C	24 hrs.	-	-	-	±	+	+
37°C	48 hrs.	-	-	±	+	+	+
Growth agar on sub-culture		-	+	+	+	+	+
Room Temp. 29-32°C.	24 hrs.	-	-	-	-	+	+
	48 hrs.	-	-	-	±	+	+
Growth on agar sub-culture		-	+	+	+	+	+
At 20°C	24 hrs.	-	-	-	-	-	+
	48 hrs.	-	-	-	-	-	+
Growth on agar sub-culture		-	+	+	+	+	+

From the data presented in Table III it is observed that with increasing soaking temperatures a parallel increase in the amount of the chemical required to produce bacterial stasis is noticed. As for example a sodium pentachlorophenate content of 0.025 gms. per cent inhibited bacterial growth for 48 hours at 20°C, while at room temperature (about 30°C) 0.075 gms. per cent of this chemical and at 37°C 0.10 gms. per cent were required respectively.

For purposes of easy comparison the relationship between the time period of soaking and the inhibition concentrations of sodium pentachlorophenate are represented in Fig. 1.

From this figure it is apparent that at any given temperature, the inhibition concentration of this chemical varied with the dura-

tion of soaking, a longer period requiring a higher concentration of the antiseptic. But in cases so far studied, the concentration



of this chemical above 0.10 gms. per cent proved lethal to the organisms *in vitro*.

Repeated trials with hide pieces soaked in four times of water were carried out for different periods under ordinary conditions and signs of deteriorations such as hair-slip and foul smell etc. caused by bacterial action were noted. It was found that with 0.075 gms. per cent of Sodium pentachlorophenate no deteriorating bacterial action was evident between 24-36 hours and as such the above concentration of Sodium pentachlorophenate could be recommended to the trade for use in soaking. Further studies are in progress.

Bacteriological Lab.

15-6-1956.

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STUDIES IN CHROME TANNING—PART II

Determination of Basicity of Chrome Liquors:

Y. NAYUDAMMA, K. S. JAYARAMAN AND
D. RAMASWAMY

SUMMARY

Lehigh method and official method were applied to the determination of basicity for chrome liquors containing added organic acids. It has been found that both the methods failed to yield correct values for basicity since the amount of acid complexed and the part remaining free could not be reckoned.

In the Official Methods of Analyses¹, the basicity of chrome liquor is calculated in an indirect manner by determining the acid combined with chromium. But this method is not applicable to chrome liquors containing organic acids. For such chrome liquors containing masking agents, Thorstensen and Theis² applied a method (Lehigh method) similar to that described by Fiegel and Kraus³ and Blaedel and Panos⁴ for determining the basicity of Aluminium salts. This is a direct method for the determination of basicity and the principle involved is simple. The addition of sod. oxalate and a known amount of H_2SO_4 to a basic chrome salt results in the production of a mole of NaOH (together with Sod. trioxalate chromiate) which is immediately neutralised by the acid present. Uberacker and Droscher⁵ applied essentially the same principle but oxalic acid was used instead of H_2SO_4 . Nayudamma and Selvarangan⁶ in their study of Aluminium complex salts noticed certain limitations for Lehigh method, in that where aluminium salts are present, the titration of excess acid should be carried to a pH 7.2 and not to phenolphthalein end-point to obtain correct results. Stubbings and Theis⁷ working independently confirmed this finding, modifying the original method titrating to pH 7.5 and using pot. oxalate in place of sod. oxalate. Selvarangan and Nayudamma⁸ modified the Lehigh Method using Sod. Tartrate for rapid determination of both the basicity and Aluminium content of basic Aluminium liquors.

Burton and Thomson⁹ recently compared the different methods for the determination of basicity of chrome liquors and concluded that Lehigh method gives satisfactory results with masked (containing formate and phthalate) and unmasked chrome liquors for the basicity value. But still, Lehigh Method appears to have further limitations. Where masking agents are in the form of salts in the chrome liquors, Lehigh method is applicable. But in the preparation of chrome liquors with excess amounts of reducing

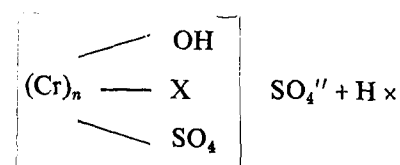
agents such as sugar, molasses etc. volatile and nonvolatile organic acids are usually present which are likely to complex with chrome. Certain amounts of acids may also be present in the free state. Where organic acids are present in excess or in a free state in basic chrome liquors, Lehigh Method fails to yield correct results for the basicity value. That such is the case can be seen from the experimental data presented below.

TABLE I

No. Acid added	Moles of Acid	% Basicity	
	Moles of chrome	Leigh Method	Official Method
Basic chrome liquor Nil	—	33.3	33.3
1. Amino acetic acid	$\frac{1}{2}$	16.0	16.0
2. "	1	16.0	2.0
3. "	2	8.0	-12.8
4. "	5	-16.0	-20.5
5. Chlor Acetic acid	$\frac{1}{2}$	-24.1	-22.7
6. "	1	-91.1	-47.9
7. "	2	-184.8	-149.0
8. "	5	-450.4	-297.7
9. Citric Acid	$\frac{1}{2}$	-94.8	-33.4
10. "	1	-184.8	-113.0
11. "	2	-498.3	-503.5
12. "	5	-972.5	-875.5
13. Formic Acid	$\frac{1}{2}$	-56.3	-4.5
14. "	1	-88.9	-22.9
15. "	2	-128.6	-98.5
16. "	5	-289.4	-287.7
17. Glycollic Acid	$\frac{1}{2}$	-16.6	2.3
18. "	1	-72.3	-26.2
19. "	2	-152.7	-128.3
20. "	5	-329.6	-314.0
21. Oxalic Acid	$\frac{1}{2}$	-64.3	-23.0
22. "	1	-136.7	-60.0
23. "	2	-313.4	-228.7
24. "	5	-667.0	-604.0
25. Tartaric Acid	$\frac{1}{2}$	-96.5	-26.2
26. "	1	-144.6	-96.2
27. "	2	-337.5	-293.7
28. "	5	-659.1	-756.5
29. Hydrochloric	$\frac{1}{2}$	—	—
30. "	1	-16.1	-11.2
31. "	2	-48.3	-38.2
32. "	5	-128.6	-138.7
33. Sulphuric Acid	$\frac{1}{2}$	-31.7	-2.4
34. "	1	-112.6	-37.3
35. "	2	-128.6	-101.8
36. "	5	-337.5	-306.0

From a study¹⁰ of the spectrophotometric behaviour of chrome salts, in ultraviolet region, certain interesting postulates were made regarding the configuration of some chrome complexes containing oxalate, acetate, amino-acetate etc. In an attempt to correlate the spectrophotometric data with the chemical data, the basicity values were determined by both the official and Lehigh methods for a number of basic chromium sulphate liquors to which calculated amounts (1 mole to 5 moles of acid per mole of chrome) of acetic, formic, oxalic, aminoacetic, tartaric, glycollic and citric acids were added (boiled and aged). These results are recorded in Table I below :

In most cases, the titre value for blank in Lehigh method is less than the value for experiment, indicating that in the experimental liquor, free acid must have been present in an amount equal to or more than that required to neutralize the alkali liberated by displacement of -OH from the chrome complex by pot. oxalate added. The free acid present could not be also determined. Titration to pH 2.8 or pH 3.3 (as suggested in Official Methods) will only give a measure of strong acids that may be present and titration to pH 8.2 to 7.5 with NaOH may titrate not only the free acid but also the chrome compound. Even assuming that the amount of the organic acid added initially to chrome liquor is known, it is not possible to take this into account since that part of the acid which is remaining free without complexing which alone is titratable, could not be comprehended. To make the picture clear, a specific example may be taken :



where HX is the acid added to chrome liquor—part of which penetrated into the complex and a part is remaining free

Assume A	-OH present	3 m.eq.
B	-SO ₄ "	3 m.eq. complexly bound
C	-SO ₄ "	3 m.eq. ionically bound
D	HX "	7 m.eq. free acid
E	X "	3 m.eq. organic acid complexly bound.
F	A known amount of acid added in Lehigh method (10 m.eq.).	

Titration with NaOH to boil to pH 8.2 :

Official method gives a measure

$$B + C + D + E$$

Lehigh method gives a measure of

$$F + D - A.$$

It is readily seen that the variables are many and equations few. Both the Official and Lehigh Methods thus fail to determine the Basicity of chrome liquors containing organic acids.

Acknowledgement: Our thanks are due to the Director for permission to publish these results.

Chem. & Phys. Divn.

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CLASSIFIED ABSTRACTS

RAW MATERIALS

THE THICKNESS OF CATTLE SKIN. D. F. Dowling. Austral. J. Agric. Res. 6, 776-785, 1955. Via. Nut. Absts. & Rev. 26, 2, 518 (1956). Skin thickness of European and Zebu cattle was measured. There was a difference between breeds and between sites of sampling. Age did not affect skin thickness, but it was greater in well nourished animals. The skin of the Zebu was thicker than that of the Angus, Shorthorn or Jersey, but not as thick as that of the Friesian, Hereford or Devon, which suggested that thick skin is not essential for heat tolerance. The papillary layer in the Zebu was thinner than in the European breeds and the glands were more densely dispersed. The relationship between skin thickness and heat tolerance is discussed, and the methods of measurement are described.

THE NETWORK STRUCTURE OF ELASTIN IN THE GRAIN LAYER OF CATTLE HIDES. Edward F. Mellon and Alfred H. Korn. Via. Shoe & Lea. Rep. 283, 1, 24 (1956). Recently a dense, filmy layer, called the grain membrane, was separated from the grain surface of limed cattle hide. In the dehydrated condition this membrane was about 0.1 mm. thick or approximately one-fifteenth the thickness of the layer extending from the grain surface to the base of the hair roots. This membrane appeared to be composed mostly of elastin, but its existence as a dense layer on the surface of the limed hide was in doubt, since histological evidence indicates that the elastin occurs throughout the papillary layer, mainly in the form of fine individual fibers.

In the present study pieces of fresh cattle hide were dehaired and cut parallel to the grain in 0.1 mm. sections. These sections were separated into three fractions: noncollagenous material, collagen, and elastin. The data indicate that the elastin is distributed throughout the papillary layer. The elastin content increased through the first five to seven slices reaching a maximum value at about one-third of the depth of the papillary layer. The concentration then decreased gradually to the elastin level found in the corium.

The elastin fibers are bound into a three-dimensional network. This network is not destroyed even by extraction over-night with 0.1 N alkali followed by autoclaving for six hours at 120°C. in a neutral solution.

Commercial trypsin solution destroys the elastin in the first two sections completely, and in the next few layers partially, in two hours at 37°C., but has no action on the elastin of the lower layers. The penetration of the enzyme into the hide is very slow.

MORE RESEARCH NEEDED TO FIND NEW USES FOR HIDES AND FATS. S. R. Hoover, *Lea. & Shoes* **132**, 2, 9, (1956). Chemical modification of hides to make leathers and other hide products with new properties so as to obtain greater diversity of uses and the development of quicker and cheaper methods of handling and tanning hides are some of the promising approaches towards the development of leather industry. Progress has been made in trying to get a light washable leather (resin tanned) which shrinks in hot water but regains its shape on cooling. By combining the hide with a chemically modified starch, a leather that wears better, that is waterproof yet permeable and which keeps its size and shape over a wide range of temperature has been produced. A suggestion is made for the shipping of dry unhaired and fleshed hides and skins instead of the raw cured ones to reduce the shipping charges and to obtain better sorting and grading. The use of animal fats in the plastic industry as a softener and in the field of synthetic detergents is also discussed.

V. V. S.

PROCESSES PRIOR TO TANNING

IS SOAKING AN IMPORTANT OPERATION? S. A. Wentland. *Rev. tech. Industr. Cuir*, 1935, **47**, 272-274. *Via. J. Appl. Chem.* **6**, 5, i-734, (1956). Soaking is necessary to open up the pelt as well as to soften it before tannage, but it encourages the development of bacteria which results in loss of substance. Figures are given to show the dependence of bacterial growth on time and temperature of soaking. It is recommended that if the water is hard, a wetting agent and an antiseptic should be added; if the water is soft, only the antiseptic is needed.

SPECIAL CHESTNUT EXTRACTS. P. Peureux. *Rev. tech. Industr. Cuir*, 1955, **47**, 188-192. *Via. J. Appl. Chem.* **6**, 5, i-734, (1956). Changes in the use of chestnut extracts during the last 20 years are surveyed, and improvements of extracts since "sweetening" was introduced are discussed. To meet the requirements of different types of tanning, pH of "special extracts" can be adjusted without altering their astringence, and conversely astringence may be varied without altering pH.

NATURAL TANNING. Otto Th. Schmidt and Water Mayer. *Angew. Chem.*, 1956, **68**, 103-115. *Via. J. Appl. Chem.* **6**, 6, i-841, (1956). Recent research on the chemistry of natural tannings is described, including amongst hydrolyzable tannings (free from ellagic acid) hamamelitannin and chebulic acid, and (amongst ellagen tannins) corilagin, chebutagic acid, hexahydroxydiphenic acid, brevifolin, dehydrodigallic acid and valonic acid. In the field of condensed tannins, catechin, gallocatechin, L-epiafzelechin, and melacacidin are discussed, together with stereochemistry and biogenetic relations. The interactions between these compounds are all described, and related to their chemical and physical properties. (90 references).

TANNING MATERIALS OF THE BRITISH COMMONWEALTH. R. W. Pearman. *Colon. Pl. Anim. Prod.*, 1955, **5**, 96-118. *Via. J. Appl.*

Chem. 6, 6, i-842, (1956). The distribution, qualities and exploitation of mangroves in various British territories are reviewed in full detail and a brief note is added concerning the chemistry of mangrove tannin. (18 references).

PREPARATION AND USE OF "ATOMISED" TANNING EXTRACTS. *F. Pothier. Rev. tech. Industr. Cuir*, 1955, 47, 213-221. *Via. J. Appl. Chem.* 6, 5, i-734, (1956). The theory behind the preparation of extracts by dehydration in the cold is outlined. Analyses of spray-dried extracts show no modification in colour or purity, whereas extracts dried at high temp. change colour and lose volatile acids, thus changing the tan/non-tan ratio. Liquid and spray-dried extracts give leather with identical properties, but fullness is lost by use of heat-dried extracts. Types of atomiser described and illustrated are : Kestner ; Laguilhaire ; Niro-France ; and Ramm. Methods are given for use of extracts in making up different types of liquor. Rapid penetration makes them particularly useful in retannage ; a recommended process is outlined.

XANTHINES, TANNINS, AND SODIUM IN COFFEE, TEA AND COCOA. *Martinek, R. G. and Wolman, W. J. Amer. Med. Assoc.* 158, 1030-1031, 1955. *Via. Nut. Absts. & Rev.* 26, 2, 337, (1956). The sodium contents per cup prepared with distilled water according to directions on the label, estimated by flame photometer, were, in m. equiv. : ordinary coffee 0.30, instant coffee 0.35, decaffeinated coffee 0.33, tea bags 0.16, green tea 0.15, unsweetened bulk cocoa 0.34, Dutch process cocoa 1.13.

Values are also given for percentages of tannin and caffeine or theobromine, and the amounts per cut in mg.

LEUCOANTHOCYANINS AS THE POSSIBLE PRECURSORS OF EXTRACTIVES IN WOODY TISSUES. *W. E. Hillis. Aust. J. Bio. Sci.* 9, 2, 263, (1956). Leucoanthocyanins in plant tissues have been estimated by measuring the anthocyanidins produced after heating with isopropanol-hydrochloric acid in a closed tube. Various tissues of *Eucalyptus sieberiana* F. Muell, *E. obliqua* L'Herit., *E. regnans* F. Muell., and *E. maculata* Hook. were studied by this method. The amount of leucoanthocyanins was observed to decrease with increasing degree of maturity of the different leaves on a stem. Most of the leucoanthocyanins appeared to be in the colourless leaf tips. The amount of leucoanthocyanin in the bark decreased during the growing season, and the amount in the cambium decreased rapidly once differentiation of the tissues began. The sapwood of *E. sieberiana* contained about half that in the heartwood. Similar results were found in transverse discs from logs of *E. marginata* sm. which contained also an outer heartwood zone. The extraneous materials in this latter zone were much more water soluble, although the alkali solubles of both the inner and outer heartwood zones were the same. The acetone solubles in *E. marginata* sapwood were largely leucoanthocyanins.

Chromatographic examination with different solvents of the alcohol extracts from different tissues of *E. sieberiana* showed that the anthocyanin in the leaves was different from that in the bark. The amount

of flavone glycosides decreased rapidly in samples taken progressively further away from the leaves. On the other hand, a mauve fluorescent component increased. Examination of the reaction products obtained after heating with isopropanol-hydrochloric acid showed that leucoanthocyanins which yielded delphinidin and cyanidin were present in all tissues except the cambium which yielded only cyanidin; the kino also yielded only cyanidin.

The view is expressed that the leucoanthocyanins in the xylem originate from the leaves and that they are the immediate precursors of bark and heartwood extractives. Evidence is given of the ease with which leucoanthocyanins are converted to other flavonoids.

PROCESSES AFTER TANNING

PHYSICAL PROPERTIES OF LEATHER FATLIQUORED AT DIFFERENT OIL LEVELS. V. Mattei and W. T. Roddy. *Via. Shoe & Lea. Rep.* 283, 1, 24, (1956). In his study the amount of oil taken up by the leather was varied by fatliquoring at different oil levels, to determine the influence of amount of oil on the physical properties of leather. The physical tests used to measure the physical properties were tongue tear, stitch tear, tensile strength, hysteresis, elongation components, needle puncture, and hardness. Statistical analyses of the data were made and the data were presented to show the influence of the amount of oil in the leather on the physical properties.

PRACTICAL CONSIDERATIONS IN WATERPROOFING LEATHER. C. W. Mann. *Shoe & Lea. Rep.* 283, 1, 25, (1956). The many recent developments in waterproofing leather have found application in a wide variety of products. In connection with these treatments the practical significance of water resistance properties is perhaps better understood than the technique of measuring such properties. In this paper the difficulties encountered in the evaluation of water resistant leather were discussed and a laboratory test method that overcomes some of these difficulties was described.

OTHER TANNAGES

NEW DEVELOPMENTS IN TANNING WITH ALDEHYDES. L. Seligsberger and Charles Sadlier. *Via. Shoe & Lea. Rep.* 283, 1, 25, (1956). The tanning reaction of aldehydes has been studied in the past primarily as a means of throwing new light on the mechanism of tanning. Tannery practice, therefore, has made little use of these studies. This paper presented results of a new investigation of the uses of formaldehyde and of various dialdehydes in tanning hides and skins. Tanning experiments were discussed which promised new ways of making leather with desirable properties and at the same time contribute to a better understanding of the tanning process.

ZIRCONIUM TANNAGE-VII DIRECT UTILISATION OF INSOLUBLE ZIRCONIUM DERIVATIVES. Ian C. Somerville and William J. Rau. *Shoe & Lea. Rep.* 283, 1, 25, (1956). In the early development of

zirconium tannage attention was centered on the use of soluble salts of zirconium. It has now been found possible to utilize some insoluble zirconium derivatives directly in tanning. These include hydrated zirconia, sodium zirconate, and sodium zirconium silicate. In this way some interesting new possibilities have been opened up which may eventually lead to a much wider application of zirconium tannage.

TESTING

REFRACTOMETRIC ESTIMATION OF THE FAT CONTENT OF RAW WOOL. G. Nitsche. *Faserforsch. u. Textiltech.*, 1955, 6, 566-568. *Via. J. Appl. Chem.*, 6, 5, 736, (1956). Working tables are worked out for enabling the fat content of raw wool to be estimated from n determinations of the ether solutions of the extracted fat. The data and tables are obtained from a very large number of estimations in which the fat content is estimated by Soxhlet extraction of the raw wool with light petroleum and subsequent evaporation of the solvent and drying of the extract to constant wt. The dried extracts are then dissolved up in 10 c.c. of ether and the n_D^{20} of the ether solutions are measured. As the constitution of the fat and hence its n_D varies with the geographical origin of the wool, correction factors are necessary as between wools of different origins. These factors are given in separate tables for wools of German and Australian origin. Large scale tests prove the method of determining the fat content from n_D estimations of ether solutions of the extracted fats to be sufficiently accurate for rapid control work (the general accuracy is to within $\pm 10\%$ and maximum error is $\pm 20\%$) and to be far more rapid than the lengthy method of Soxhlet extraction and drying the extract to constant wt.

EVALUATION OF WATER ABSORPTION TESTS FOR QUILON-TREATED SUEDE LEATHER. Albert E. Chouinard. *Via. Shoe & Lea. Rep.* 283, 1, 24 (1956). Various methods of determining the water absorption properties of sheepskin suede garment leather treated with a commercial water repellent were studied for the purpose of determining a method which would properly evaluate the water-resistant leathers commercially produced. In addition a method was sought which would be simple, accurate, and usable as a tannery control.

The dynamic water absorption method as prescribed by the American Association of Textile Chemists and Colorists (AATCC) was examined and found to be inaccurate in this particular case. A modification of it was used in the early phases in order to accumulate data and general knowledge of the materials.

It was found that all these leathers yield a typical curve for Water Absorption versus Time even though a wide variation of conditions is practised, running from a static condition to accelerated mechanical action in an accelerator. This curve is a direct indication of the water resistance of each leather, the better leathers levelling off early in the test and showing a waterproof nature from this point on.

Skins selectively tested over their entire surfaces indicated very slight variations in water absorption properties at any point. This is particularly significant inasmuch as practically all chemical treatments of leather show a wide variance of dispersion within a skin or hide due to the variation of fiber size, pattern, and density.

A static immersion method was devised using the entire skin, thus obviating destructive testing. Moreover, using such a large specimen permitted the use of less critical apparatus and technique without affecting accuracy.

QUANTITATIVE ANALYSIS OF AMINO ACIDS USING PAPER CHROMATOGRAPHY. R. H. Hackman and Marian Lazarus. *Aust. J. Bio. Sci.* 9, 2, 281 (1956). A simple method for the quantitative analysis of amino acids present in a protein hydrolysate, or in other mixtures of amino acids is described. The amino acids are separated on one-dimensional paper chromatograms, four solvent systems being used to resolve 17 amino acids. The chromatograms are treated with a suitable reagent to detect the spots corresponding to each amino acid. Each chromatogram, after being made semi-transparent with dimethylphthalate, is scanned automatically, with a densitometer, and the intensity of the light transmitted by the coloured spots is recorded on light-sensitive paper. A straight line relationship was found to hold, for all amino acids, between concentration and log per cent. transmission. The most useful range of amino acid concentration was 2-5 mM although the method is usable in the range 1-10 mM. The method includes a number of new techniques and the average coefficient of variation for a single reading for an amino acid is 5.7 per cent.

AMINO-ACID COMPOSITION OF KERATINS. III. AMINO-ACID COMPOSITION OF DIFFERENT QUALITIES OF WOOL. D. H. Simmonds. *Aust. J. Biol. Sci.*, 1955, 8, 537-540. *Via. J. Appl. Chem.* 6, 5, 736, (1956). Ion-exchange chromatography on "Dowex 50" of 16-hr. 6N-HCl hydrolysates of Merino 70's and Corriedale 56's showed little differences in amino-acid composition when compared with that previously reported for Merino 64's.

FLEXIBILITY GAUGE. Alfred W. Hopton. *Via. Shoe & Lea. Rep.* 283, 1, 24, (1956). Flexibility or stiffness, and temper are perhaps the primary physical characteristics of leather, other than sturdiness, which determine its usefulness and quality. Yet these properties are seldom measured in everyday practice in terms of a numerical value.

This paper described and gave data on a hand-size device for testing flexibility and temper. It is suitable for both heavy and light leathers and is sufficiently rugged for general plant use. Specimens are tested in a manner simulating actual use conditions and for light leather a test on a single specimen gives favourable representation of the leather tested. Test results were given for a variety of leathers and other materials, and suggestions given as to how it may help in controlling quality and aid in research.

GENERAL

TAMARIND "PECTIN" INDUSTRY OF INDIA. G. R. Savur. *Chem. & Ind. No.* 13, 212, (1956). Properties, composition, method of manufacture of Pectin from tamarind seed and its application to various industries are described and a brief note is added concerning the use of tamarind pectin as an ingredient of dressing compositions, preparations for accelerating tanning action and weighing compositions in leather industry.

NEW CONCEPTS OF RESEARCH FOR LEATHER INDUSTRY. W. D. Johnson and Howard Gottlieb. *Via. Shoe & Lea. Rep.* 283, 1, 24, (1956). The Leather Industry has been preoccupied with internal research problems for improving current technology for leather processing. This has been justified by expediency of cost return of research investment, but has paid the penalty of loss of markets to plastic synthetics and other substitutes. Is it too late to look at tomorrow's leather market in the light of a different concept of tanning technology?

Leather preparation requires three basic processes, namely: removal of hair, stabilization of hide against deterioration, and finishing the leather for the particular application. Research in leather processing should be aimed at devising new systems for making leather based on eliminating antiquated procedures and treatments, not trying to improve them. Research in leather based on this premise of the treatment of hides with radio-active isotopes to minimize the complexity of technology and processing steps represents a new concept in research. This will yield new and different leathers to recapture lost markets and maintain and improve the markets for leather in the future.

EPOXIDE RESINS, THEIR PLACE IN INDUSTRY. E. S. Paice. *Via. Chem. & Ind. No.* 29, 760, (1956). Epoxide resins exhibit a number of outstanding properties of value in a variety of industries and are as yet only at the beginning of their development.

The paint industry is and will probably remain the main outlet for epoxide resins and in the U.K. a potential market of 4000-5000 tons per annum in 1960-62 would appear quite reasonable for surface coating applications.

The electrical industry also represents a major outlet for epoxide resins, primarily for encapsulation and to a lesser extent for laminates and printed circuits. The demand from the electrical industry could well reach 1500 tons by 1960-62.

It is too early to assess whether the improved performance of epoxides will enable them to compete in the structural laminating field, but storage tanks and piping probably offer the biggest prospects.

Another recent development has been the manufacture of plastic tools, jigs and dies. Epoxide resins are preferred for this application and

though it is now in its infancy it may develop to be second only to surface coatings as a volume outlet for epoxides.

Stopping compounds and patching kits represent a potential usage of about 100 t.p.a. and within five years the epoxide resin requirement for PVC stabilizers should reach 50 t.p.a.

Epoxide resins are likely to remain inherently more expensive than the established competitive synthetic resins and the key to their increasing usage will be (i) their full utilization where high performance is more important than direct cost, (ii) improved formulation and application techniques, (iii) judicious combination with conventional materials to reduce cost without too great a sacrifice of the unique performance characteristics of the epoxide resins.

A LABORATORY METHOD OF TANNING LEATHER FOR THE EVALUATION OF THE EFFECT OF VARIABLES ON LEATHER QUALITY. *Herbert J. Hodus and Robert L. Stubbings. Via. Shoe & Lea. Rep. 283, 1, 24, (1956).* The tool needed most by leather research technologists is a reliable method for evaluating the effects of process changes on leather qualities such as break, temper, fullness, etc. The laboratory scale methods that have been developed so far have not proven either adequate or reliable. Therefore, there is a great need for a laboratory method which yields the same results as large scale tests in order to decrease the time necessary to run a test and also to reduce the cost per test.

The Lehigh Laboratory has worked on various phases of this problem and has developed a workable and reliable technique for producing experimental leather in a laboratory and evaluating it in terms of leather quality.

In order to do this a high speed vertical oscillator has been developed to take the place of a drum. Other specialized equipment has been developed including a laboratory staker, a variable temperature-humidity cabinet, a photocell area comparator, and pasting the drying techniques.

The validity of this laboratory method has been proven by running the same experiments in full scale packs in a tannery and comparing them with the laboratory results.

BY-PRODUCTS

THE DYEING OF ACRILAN—WOOL BLENDS. *W. H. Hindle and T. H. Guion. Fibres Eng. & Chem. 17, 8, 253, (1956).* The dyeing of a blend of two fibres, such as Acrilan acrylic fibre and wool, is most readily understood through a knowledge of the methods of dyeing each fibre by itself. The dyeing of wool is too well known to require any comment, but Acrilan is relatively new to the market. The differences between it

and other acrylic fibres are not widely known or fully appreciated, especially when blended with wool. Consequently, the dyeing of Acrilan should be introduced with a brief discussion of acrylic fibres in general and of Acrilan in particular. This paper is in the nature of a progress report, presented in such a way as to bring the reader up-to-date on the state of the art and to enable him intelligently to utilize and to develop these methods.

THE PRE-NATAL DEVELOPMENT OF WOOL FOLLICLES IN MERINO SHEEP. *Margaret H. Hardy and A. G. Lyne. Aust. J. Bio. Sci. 9, 3, 423, 1956.* A histological study has been made of wool follicles in skin from the trunk of 24 sheep fetuses ranging in age from 69 to 145 days of gestation. Fifteen of these fetuses are known to be entirely Merino in origin, and the remainder are believed to be wholly or predominantly Merino. Extensive use has been made of serial sections parallel to the axis of the wool follicles as well as those parallel to the skin surface. Skin from Merino lambs and adults has also been examined.

A series of stages in the development of hair follicles in mammals is defined. The special features of each stage in the development of primary and secondary wool follicles in the Merino are indicated. Secondary follicle development, not fully described hitherto for any breed of sheep, shows some distinctive features, the most important of which is the origin of later follicles by branching from earlier ones. Thus there are two types of secondary follicles, original and derived. Some preliminary information has been obtained about their development and structure in late pre-natal and early post-natal life.

Carter's (1943) proposed series of stages of wool follicle group development, based on the appearance of transverse sections of skin at the level of the sebaceous glands, are re-defined in the light of the present observations and accompanied by a table showing the stage of development of each type of follicle.

Attention is drawn to the need for further study of the way in which branching follicles contribute to the development of the wool fibre population in Merinos and other breeds of sheep. Some possible implications for current researches on this subject are discussed.

PROPERTIES OF WOOL ROOT PHOSPHATASES. *J. M. Gillespie. Aust. J. Bio. Sci. 9, 3, 448, (1956).* Wool roots prepared by the wax sheet technique contain pyrophosphatase, phosphatase, and metaphosphatase. Of these the pyrophosphatase is the most active. It appears to carry an essential—SH group, is activated by Mg^{++} ions, and shows optimum activity at about pH 6.5. The phosphatase is not activated by metals nor inactivated by chelating agents or —SH inhibitors. Its optimum pH is not sharp but appears to be in the range 5-7. The metaphosphatase is activated by Mg^{++} and has an optimum pH of about 7.

PATENTS

REACTION (PRODUCTS OF) FATTY ACID CHLORIDES WITH PROTEINS. Armour & Co. (Inventor: H. L. Keil) (B. P. 736, 584, 9.2.51). *Via. J. Appl. Chem.* 6, 6, i-842, (1956). Product obtained by treatment of protein or its hydrolysate with an oxidizing agent, e.g. H_2O_2 , peracetic or permonosulphuric acid (to effect hydroxylation) is condensed with a fatty acid chloride of 1—22 (12-18)C, to give a compound useful in the waterproofing of leather, tennis strings, etc., or for rendering glue water-resistant. Thus, a mixture of fresh cattle hooves (1000), water (3000), and NaOH (500 g.) is boiled during 5 hr., then concentrated to 60% of solids. The unfiltered liquor, pH 10.5, is treated (500) at 25° with 30% aq. H_2O_2 30 c.c., then after 3.5 hr. lauryl chloride (300g.) is added, temp. rising to 70°, and the product is dried at 55°.

ORGANO-SILICON WATER-REPELLENT COMPOSITIONS. Midland Silicones, Ltd., (B. P. 736, 378, 18.6.53. U.S., 4.8.52). *Via. J. Appl. Chem.* 6, 6, i-842, (1956). Organo-silicon water-repellent compositions, particularly useful for impregnating leather, comprise a mixture of (a) 15-50% by wt. of a Ti compound of formula $Ti(OR)_4$, or a hydrolysate thereof sol. in aliphatic hydrocarbons, where R is a $C < 13$ aliphatic hydrocarbon radical (Bu) or a $C < 13$ aliphatic hydrocarbon radical containing < 4 OH groups; (b) 5-70% by wt. of a methylsiloxane copolymer (I) composed of trimethylsiloxane units and SiO_2 units which are present in such proportion that the ratio of Me radicals: Si atoms is 1: 1-2.5: 1; and (c) 15-80% by wt. of one or more polysiloxanes of formula $R'n.SiO(4-n)/2$ (II), where R' is a $C < 4$ alkyl or alkenyl radical (Me) or a monocyclic aryl radical and n has an average value of 2-2.9. Finished or unfinished leather may be impregnated with the compositions, or pastes of them, or solutions of them in volatile solvents, to yield products having a resistance to water 5—150 times than previously known.

NOTES & NEWS

SITKA SPRUCE BARK PROVES SUCCESSFUL IN TANNING TRIALS IN ENGLAND.

Tanning trials on two sheep skins with sitka spruce bark from Gywdyr and Eggesford Forests were successful in producing the type of leather suitable for wallets and other light leather goods. This is reported in the Forestry Commission's annual report on forest research for the year ending March 1955.

Some 16 samples of home grown sitka spruce bark from different parts of the tree, from trees of varying vigour and from different localities have so far been analysed by the B.L.M.R.A.

The results indicate that the tannin content expressed as a percentage of the oven dry weight varies between 14.9 and 22.5, the other water solubles (non tans) vary between 11.1 to 15.2 percent., the red colour between 2.9 and 5.9 units and the yellow between 6.8 and 18.5 units.

—*Lea. Tr. Rev.* 120, 3654, 99, (1956).

SMOKE CURING OF FISH—An automatically controlled electrostatic technique has been developed at the Laboratories of the Department of Science & Industrial Research, U.K., for smoking fish for curing purposes. The new technique gives uniform deposits in 30 min. as compared to 6-18 hr. necessary in the traditional smoking process in which fish have to be hung in a smoking chamber where smoke is drawn in by a fan from an external source and passes in a horizontal stream round the fish.

In the new process, smoke is generated in a fluidizer which consists of a vertical cylinder in which sawdust is maintained in a state of violent agitation by a blast of hot air. The composition of the smoke can be varied by changing the temperature of hot air. The smoke particles are given an electric charge and made to enter the smoking chamber. Since the particles carry similar charges they repel each other and are rapidly and evenly deposited on the fish.

—*J. Sci. Industr. Res.* 15-A, 9, 414 (1956).

HANSA D. TANNING EXTRACT—Hansa D sulphite cellulose tanning extract in powder form is mainly of use to vegetable tanners, but, say the makers, Zellstoffabrik, Waldhof, it can be successfully used in many other ways. It is a lignin tanning extract containing tanning materials from pinewood in the production of cellulose by the sulphite process. A brochure and leaflet have now been issued describing in detail this particular brand and these can be obtained on application to Andrews and Co., Ltd., 33/34 Chancery Hansa D extract. The brochure states that a tannin analysis by the hide-93% sol. solids 93% 93%, insoluble 0% 0%, tannins 70%/60%, non-tannin 23%/33%, purity, 75%/54.5%, pH of the analytical solution 3.2-3.5/3.2-3.5

—*Lea. Tr. Rev.* 121, 3669, 216, (1956).

PERSPIRATION FASTNERS.

Use of Fixanol PN for improving dyestuffs on vegetable tanned lining leather and chrome tanned upper leather is the subject of I.C.I. Technical Information leaflet (Dyehouse) No. 316, published by I.C.I. Ltd., Dyestuffs Division, Hexagene House, Blackley, Manchester.

—*The Lea. Tr. Rev.* 121, 3669, 216, (1956).

AUSTRALIAN TANNIN RESEARCH.

The Australian leather industry is reported to be trying to find out new sources of tannin, which costs the country about £A 1,000,000 a year in imports. The laboratory of the Australian Leather Research Association at Lane Cover, New South Wales, is at present testing the bark of the Monterey pine, *Pinus Radiata*, which came to Australia from the US, for suitable tannin.

It has been established that the bark produces tannin, though not of a quality required for tanning leather. The laboratory is determining the age at which the tree has the best yield and experiments will be carried out to see whether chemical treatment can improve the tannin sufficiently for the requirements of the leather industry.

—*The Chem. Age*, 74, 1911, 490, (1956).

C. L. R. I. NEWS

EXECUTIVE COUNCIL OF CENTRAL LEATHER RESEARCH INSTITUTE

The Executive Council of the Central Leather Research Institute met on 12th October at the Institute and Dr. A. Lakshmanaswami Mudaliar, Vice-Chancellor of the Madras University and Chairman of the Council, presided.

The Council, among other things, considered the proceedings of the Scientific Advisory Board in regard to research programme for 1955-56 and also the future programme for 1956-57. Recommendations of the Scientific Advisory Committee relating to research projects for 1956-57 were considered and approved.

The Council also considered major research projects that are to be undertaken during 1956-57. The following are some of the major research projects to be undertaken in the Institute: improvements of Hides and Skins; research work with a view to reduce import of tanning materials and to increase the supply of indigenous tanned stuff to the tanning industry; developing processes by conducting original research for manufacture of variety of finished leathers; improvement and modification of the existing technique and finding newer use for leather manufacture; to furnish Indian Leather industry with essential leather auxiliaries and utilisation of tannery by-products and waste.

The Council also considered construction proposals—additional building requirement—during the Second Five-Year Plan period and capital and recurring grants to be spent in the Second Five-Year Plan. Total capital grant available for the Second Five-Year Plan is Rs. 21.24 lakhs and annual recurring for five years ending 1961, is Rs. 62.5 lakhs. The capital grant is to be spent on buildings, services equipment and furniture.

The Council also decided to invite people belonging to the leather trade as a sort of 'open house' for a couple of days every quarter. Tanners from all over India will be invited to this Institute to give an opportunity to see the progress of research made in the Institute.

The Council decided to conduct a symposium on curing, preservation and improvement of Hides and Skins during this year.

Among those who attended the meeting were Raja Sir Muthiah Chettiar, Mr. M. J. Jamaludeen, Mr. T. K. Palaniappan, Director of Industries & Commerce, Dr. Y. Nayudamma, Assistant Director-in-charge of the Central Leather Research Institute, Guindy, Mr. P. M. Sundaram, Secretary, Council of Scientific and Industrial Research, Mr. A. J. Sharaman, Mr. G. S. Srinivasa Aiyar and Mr. Hajee C. Fakir Mohamed.

Dr. Y. Nayudamma, Assistant Director-in-charge, Central Leather Research Institute attended the meeting of the Hides and Skins Committee of the Indian Council of Agricultural Research held at New Delhi on the 26th October 1956 and got the four following schemes put up by the Central Leather Research Institute extended for the period of 2 to 3 years. (i) Mineral Tannages. (ii) Fatliquors, (iii) Leather Boards and (iv) Chrome retan leather.

The Syndicate of the University of Madras has appointed Dr. Y. Nayudamma as Hon. Professor of Leather Technology in the A. C. College of Technology, University of Madras.

Shri S. Ghosh, Junior Scientific Officer has been awarded the D.Phil. Degree by the Calcutta University for his thesis on "Studies on the physico-chemical properties of hides, tanned and untanned".

ASSOCIATION OF LEATHER TECHNOLOGISTS, MADRAS

The inaugural meeting of the Association of Leather Technologists, University of Madras, was held on Friday the 21st September 1956 in the Central Leather Research Institute, Madras. Dr. Y. Nayudamma, Assistant Director-in-charge, Central Leather Research Institute, presided over the meeting and Dr. D. Pattabiraman, Director of Animal Husbandry, Madras, delivered the inaugural address.

After tea, Dr. Y. Nayudamma moved a condolence resolution on the sad and sudden demise of Prof. B. M. Das, Director of the Central Leather Research Institute and President of the Association of Leather Technologists. In moving the resolution he said "We miss amongst us a gentleman who had been associated with this Association of Leather Technologists very closely and who was very near and dear to most of us. He is no other than the late Prof. B. M. Das. To Prof. Das, leather technology was not a profession. It was actually his life mission. He had not written a chapter but actually written a book for himself in the field of leather industry in India and he is rightly called the Father of Modern Leather Industry in India. His patience for work and service for the uplift of the leather industry in India had actually reduced his life and he died in harness. No words would well describe his extraordinary merits and no praise is great for the extraordinary services rendered by him to leather technology and leather industry of India. As a professor he was very genial and was always ready and willing to help students in every way. He would even go out of the way to do things for his students. He was always ready to impart the voluminous knowledge he possesses. His indomitable energy, his meticulous care and miraculous memory, his perseverance and patience are few of those extraordinary merits that stand out in the minds of the people who had had the good fortune to be associated with him. We have assembled here and this Association shall remember him even though is not present with us. The best that we could do is to live to his ideals and the best expectations which he gave for the industry and to carry the torch onwards to put the leather industry of India on the map of the world".

The following resolution was read and adopted.

"This meeting of the members of the Association of Leather Technologists bemoans the irreparable loss sustained by them at the sad and sudden demise of its President, late Prof. B. M. Das, and conveys its heart-felt condolences to the members of the bereaved family".

Dr. Y. Nayudamma traced the history and growth of the Association from the year 1945 with its first President, the late Sri K. Seshachalam Choudhury and said that it was reconstituted and remodelled in the year 1947 and at present was acting as a branch of the major Association of Technologists whose headquarters is in the Alagappa Chettiar College of Technology with Dr. A. Lakshmanaswamy Mudaliar as President. During the past few years, the activities of the Association were not much mainly due to the fact that the number of students that was attached to the group were not too many, only 10 students admitted annually. The reason was that the students trained in Leather Technology should get themselves engaged only in leather industry, to carry with them modern scientific knowledge and to put the leather industry on a more solid and scientific level. The present group of students are very enthusiastic and they wished that this Association should be activated and thus we are having the first meeting. He welcomed all those present and appealed to those engaged in the industry to come forward to give their full support and benefit of their advice and guidance and to make the Association very successful and useful. He added that the manufacture of leather involves about 20 different branches of science and that every tanner knew that good leather cannot be made out of bad hides. This has become an important and urgent problem, particularly to India on account of campaigns such as the anti-slaughter campaign. Although 80 to 90 per cent of the hides come from naturally dead animals and that these campaigns have no intrinsic value, still we have got the problem. The student of leather knows that the final quality of the leather depends largely upon the original animal itself, its age, sex, breeding environment, climate etc. He introduced Dr. Pattabiraman, Director of Animal Husbandry, as a gentleman who is a born livestockman and who has an inherent love for animals and who is an expert in the breeding and rearing of various animals and who has won for himself the appreciation and the admiration of all the people, particularly in the Veterinary world for his loving care of the animals and for his expert knowledge. He then requested Dr. Pattabiraman to deliver the inaugural address.

Dr. Pattabiraman associated himself with the sentiments and the homily expressed by the President in paying a tribute to the eminent scientist whose name will be associated with this Institute for ever. Nobody in the trade can forget the services rendered by Prof. Das and his name will long be remembered by the younger generations. He also congratulated Dr. Y. Nayudamma who has succeeded him and added he had every confidence that he would keep up the reputation that had been established for this Institute. He then delivered the inaugural address.

"It is very kind of you to call upon me to deliver this inaugural address of your Association and I thank you very much for having given me this opportunity to associate myself with you. Whatever may be the future, I feel that there is close relationship between my department and the studies you are developing here. On my part, I am mainly concerned with the development and health of livestock by scientific breeding and nutrition. Your part comes in, after the death of the animal to exploit it for the benefit of mankind. I wish to emphasise that you and I have a great part to play in the economic life of our country.

As you are all aware, in an agricultural country like ours, the economic prosperity of the nation depends mostly, on the development of our livestock industries. Particularly in India we have the largest cattle population in the world and the cattle wealth is indeed a major share of the national income.

One of the most important livestock industries in this State judged by the test of production and export trade, is the hides and skins industry. It has been estimated that skins and hides amounting to Rs. 10 crores annually is being exported from India mainly to U. K. If one turns back the pages of the history of the leather industry, it will be seen that the beginning of this industry counts the savage age of the man. Tanning was one of the earliest industries besides Agriculture. As time advanced, the leather industry has gradually developed and all of you who are in this Institute are specialising in the technology and are ready to advise on all matters connected with leather industry. I must congratulate you on the researches, development and number of experiments done in this field. I wish to point out that all these researches, on skin and hides depend largely on the development of a healthy livestock industry in India.

"The weaker the cattle, the scantier the production, the feeble the nation." Animal Husbandry has been a much neglected science in India and is generally subordinated to the needs of Agriculture rather than be allowed scope for development on its own forms. There has therefore been no occasion for the livestock industry to prove its potentialities or stabilising India's economy and of making all the difference to the life and happiness of its million cultivators. Even from the present day degenerate cattle, we are getting an income amounting to about Rs. 3,500/- crores every year out of which hides and skins contribute no less a sum of Rs. 40 crores.

As you are all specialists in the leather technology and industry, I need not deal at length on the importance of the industry in the economy of the nation and other allied factors, but I would like to give you an idea of the part played by the Animal Husbandry Department of this State for the production of quality skins and hides.

It has been estimated that as per livestock census of 1951 Madras State possesses 12.1 million cattle, 2.89 million buffaloes, 3

million sheep and 4.5 million goats. The annual contribution from these livestock by way of work, production and manure is about Rs. 105 crores out of which about Rs. 10 crores is derived from skins and hides. A major portion of the livestock is non-descript and suffer from mal-nutrition. The cattle are being upgraded by the use of approved pedigreed bulls. The Government maintain livestock farms to keep up the purity of the breeds of cattle and to supply pedigreed bulls for grading up village cattle. Intensive work is undertaken in restricted compact areas and there are now 15 Key Village areas where cattle improvement is done on all aspects. At present there are about 1300 bulls all over the State under different schemes and though it might take time, the stamping out of ill fed, ill bred and stunted cattle, is well on its way. It may be mentioned that a well bred bullock or cow converts most of the food consumed to milk or work or good hide or skin. A poor quality animal will always yield only a poor quality hide. Any livestock industry must have its own efficient health service. One might ask whether the ravage of epidemic is not well compensated by the multiplication of the uneconomic cattle. But, we have no means of directing epidemics to inflict its toll to unwanted cattle. More often epidemics only pick up the best. We have to control diseases more efficiently if we are to build a superior stock, because they fall an easier prey. The greatest killing disease of all, is "Rinderpest" or "cattle plague." Its ravages were so great that agricultural operations were threatened with total paralysis and it became expedient to carry out mass inoculations against this virulent disease and the Institute for Veterinary Research was established at Mukteswar for production of the required biologicals throughout the State. But due to difficulties involved in the transport of biologicals over long distances from North India to the South and the lapse of time in such transport, the Madras State started its own biological-products station, as early as 1932 at Madras. All vaccines and sera for Rinderpest, Anthrax and other allied diseases which rapidly deteriorate the condition and structure of the hide, are prepared at the Institute of Veterinary Preventive Medicine at Ranipet. The Institute is the first in India to be provided with such modern equipments as Deep Freeze and Edward Spin. Freeze dried vaccines are being released for the first time in this State and for the whole of India under the "All India Rinderpest Eradication Scheme". It is a matter of pride for the department that Madras has actually eradicated Rinderpest from its territory and its 15 million cattle are saved from the ravages of the disease. This disease is a febrile disease and hides from infected cattle show the characters that one would expect in an animal greatly emaciated as the result of acute fever. This department has been carrying out advance preventive inoculations each year against this disease and other contagious diseases which are detrimental and there is progressive decrease in cattle mortality from such contagious diseases. Compared to the large cattle population of the State, the number of animals that died of contagious diseases is very small. The trend of fallen hide production in the State mainly depends upon the cattle mortality.

Ring worm is yet another disease which leaves bald patches. These patches show disquamation and crest formation leading to

roughly circular damaged patches on the grain surfaces. Animals recovered from Ring worm do not generally show permanent scars and treatment by the Veterinarian has been of help in the hide industry. The department has been very helpful in combating sarcoptic mange or scabies by preventive and timely dipping.

It needs no emphasis that proper flaying and curing of the raw skins and hides is of paramount importance for proper preservation and marketing of skins. It is observed that organised efforts made in other countries for improving the general standard of flaying and curing have given encouraging results. Taking into consideration the poor methods of flaying adopted in different slaughter houses and under village conditions, the Department of Animal Husbandry is running a flaying school at the Madras Veterinary College to improve the technique of flaying. I would like to state that the Madras Veterinary College which was established as early as 1903 has attracted the attention of several international workers in the field and has done yeoman service for Veterinary Education and Research. The Flaying School at the Madras Veterinary College was started during February 1953 and 201 amateurs and 71 butchers have already been trained at Madras and in the districts. Flaying auxiliary centres are also opened in the districts and butchers trained. These auxiliary centres are run by Veterinary Assistant Surgeons trained by the Flaying Staff of the Madras Veterinary College. The Flaying Staff conduct practical classes at the Madras Slaughter House and the theoretical instructions are imparted at the College and the course is of 3 months duration. Some improvised knives for flaying were designed and some of these are being used by butchers at the slaughter houses.

The Animal Husbandry Department is conscious of the fact that only about 15% of the total hides produced in the Indian Union are from slaughtered animals. The rest 85% are from fallen hides and to improve the Flaying of these fallen hides, the training to skilled flayers, must be taken into the villages. Flaying is therefore being taught to the Final Year B.V.Sc. students so that they, in their turn, will be able to demonstrate the improved technique to the villages. It might interest you to know that there is a proposal to include flaying as a part of the Grama Sevaks' Syllabus. It is also expected that in course of time, the Municipalities would employ only such of those candidates who have undergone this course of training for flaying work in the slaughter houses.

The Indian Veterinary Research Institute at Izatnagar has a special Research Officer for hides and skins and his researches on the warble flies and tick and the best methods of control or eradication are being carried out in the field. It would not be out of place to mention that 600 to 700 warble holes have been recorded in a single hide and these occur on the costliest part of the hide, namely the back region. But fortunately this menace is not found in the South. Spraying of sheep, cattle etc. with insecticides are being regularly undertaken by the Department.

Thus, it would be seen from the above that this department is not only doing preventive inoculations etc. to prevent the cattle mortality which will in turn reduce the production of fallen hide but also training professional and amateur butchers in the art of flaying in different centres which would benefit the economy in the production of hides and skins.

In conclusion, I would like to say that the Leather Industry is lagging behind to the detriment of India's economy and it is essential that it should be developed and brought in line with the leather industries of the Western countries by application of Science and research. India annually produces hides and skins to the tune of Rs. 40/- crores. If all these hides and skins were tanned and converted into finished leathers, it is estimated that a total annual production of various kinds worth about Rs. 80/- crores would be possible. This is a target of industrial production which seriously deserves aiming at. Again the annual exports of raw goat skins which are surplus to the present needs of the tanning industry amounts to 17 million pieces, worth over Rs. 7 crores. A large part of the skins exported is suitable for the manufacture of glazed kid leather, an item not yet produced in the country on a scale commensurate with the availability of the basic raw material.

Attempts should be made to produce leather of best possible quality because a great bulk of India's leather has to be exported to foreign markets where its competing strength should be increased by better quality. Besides, leathers of the very best quality are required for defence Services. So, both for India's economy and defence, her leather production must be increased in volume and variety and the quality produced must be of a high standard. Leather technology is a very complex technique and requires for its processes, quality material—a rusty knife used in flaying and a sharp pointed knife in unskilled hands may cause irreparable damage, to hides and skins.

In fine, I wish to impress that the Animal Husbandry Department will seek to develop a large and healthy hide and skins industry, and it is left to you to improve its processing."

After the inaugural address, Dr. G. S. Laddha, Acting Prof. in-charge, Alagappa Chettiar College of Technology gave away the prize in the shape of books to the value of Rs. 75/- donated by Shri S. P. Pandit, Western India Tanneries, Dharavi, Bombay to Sri Boothalingam, the best student in the B.Sc. (Tech.) Leather Tech. examination held in 1955.

Dr. Y. Nayudamma appealed to the members of the tanning industry to come forward with such donations as it would give an incentive and encouragement to the students of leather technology.

The Secretary of the Association proposed a vote of thanks.

The following members of the staff have been promoted with effect from 27th Aug. 1956.

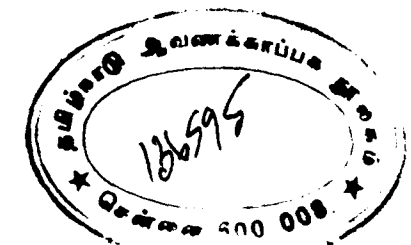
1. Sri B. C. Basu, Senior Scientific Assistant as Junior Scientific Officer.
2. Sri P. S. Venkatachalam, Senior Scientific Assistant as Junior Scientific Officer.
3. Sri S. C. Nandy, Junior Scientific Assistant as Junior Scientific Officer.
4. Sri S. N. Bose, Junior Scientific Assistant as Senior Scientific Assistant.
5. Sri G. Roy Choudhury, Junior Scientific Assistant as Senior Scientific Assistant.
6. Miss A. Nagasiromani, Senior Laboratory Assistant as Junior Scientific Assistant.
7. Sri S. C. Dhar, Senior Laboratory Assistant as Junior Scientific Assistant.
8. Sri K. J. Scaria, Senior Laboratory Assistant as Junior Scientific Assistant.

We welcome the following new members of the staff, who have joined the Institute.

1. Sri N. R. Sikdar, Junior Scientific Assistant.
2. Sri V. Radhanandha Kishore, Junior Scientific Assistant.
3. Sri M. A. Rama Iyer, Junior Scientific Assistant.

VISITORS

Name	Date of Visit.
Lal C. Verman, Director I.S.I.	4-9-1956
German Consulate in Madras	9-9-1956
V. C. Sharma, I.A.S., Secretary, Education Ministry, U.P.	24-10-1956
Lt.-Gen. H. Williams, Director, Central Building Research Institute	24-10-1956
Lt.-Col. K. Rajan Raju	29-10-1956



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