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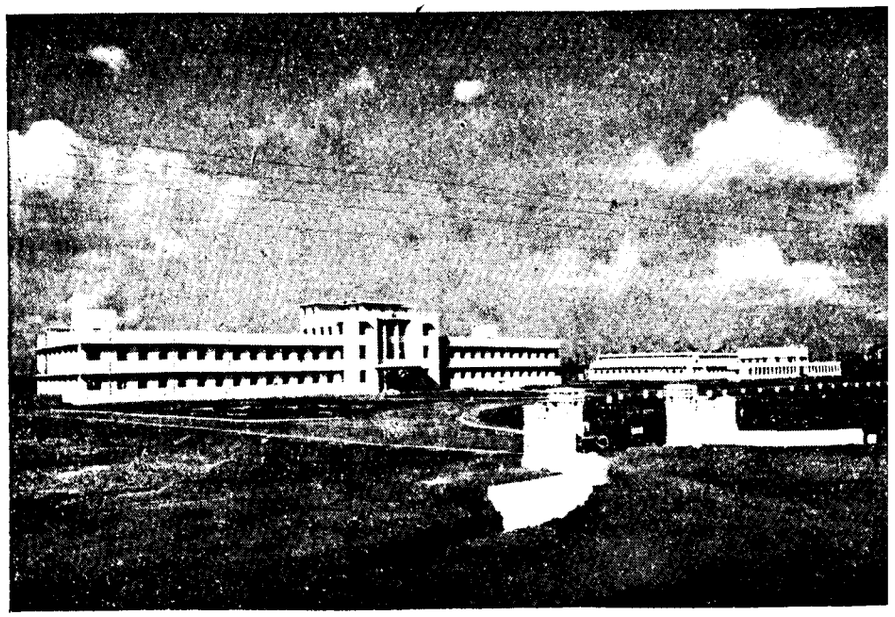

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CONTENTS

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Announcing the publication of

C. L. R. I. BULLETIN No. 3

"Manufacture of Roller Skins"

Three different processes for the manufacture of Roller Skins from East India sheep skins and from chrome tanned calf developed by the Central Leather Research Institute have been published. **Price Re. 1/ each**

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The Assistant Director-in-charge,

CENTRAL LEATHER RESEARCH INSTITUTE,

ADYAR, MADRAS-20.

"The enthusiastic Director of the Institute took us round and we were greatly impressed with the functioning of the Institute. Probably this may be a model institute in the chain of laboratories founded by the Government of India. Results of scientific research are translated into physical objects and close association is maintained with the trade and industry, which is very encouraging indeed. The various departments are in charge of highly qualified and devoted people. There is bright future for the Institute and we are really proud of this Institute. We wish success to all who are associated in this National Institute."

Public Accounts Committee.

Madras,
9-1-1957.

INAUGURATION OF 'OPEN HOUSE' AND PRACTICAL DEMONSTRATION AT CENTRAL LEATHER RESEARCH INSTITUTE

Prof. M. S. Thacker, Director-General, Scientific and Industrial Research, inaugurated the 3-day Open House and the 3-Week Practical Demonstration on the manufacture of chrome retan leather at the Institute on the 28th January 1957 before a large gathering of the representatives of the tanning trade and industry from all over India. Representatives from Government Departments included Dr. S. D. Mahant, Secretary of the National Research Development Corporation of India, New Delhi.

Mr. M. J. Jamal Moideen, presiding over the function, said that there are two sections of the industry which are living in water-tight compartments, viz. the E.I. tanning industry and the chrome tanning industry. Of course, chrome tanning industry is based on a lot of scientific research and modern thought. Because of this, it cannot be said that the E.I. tanning industry is antiquated, crude and employs manual labour. Each of these types of industries have developed methods that are best suited for themselves. It is true that machines could be introduced and employed in the East India tanning industry also. It is an irony of fate that the people connected with the E.I. tanning industry very often have misgivings about qualified people in the subject because in most of the Western countries, qualified people are taught usually the modern methods of tanning and so they think that what is done in India in the E.I. tanning industry is very crude and they look down upon the industry and the people connected with the E.I. tanning industry.

The Central Leather Research Institute, he said, has been doing very useful service to the tanning trade and industry and it is trying to demolish the compartmental system thereby bringing both the sections nearer. The E.I. tanning industry has not utilised the methods developed for E.I. tanning by the Institute. It is for that purpose, to popularise such ideas, that this Open House has been thought of and is being inaugurated by Prof. M. S. Thacker who is the embodiment of scientific advancement.

Dr. Y. Nayudamma, Assistant Director-in-charge of the Institute, accorded a very sincere and hearty welcome to the President, Prof. M. S. Thacker and the representatives of the tanning trade and industry. He paid a tribute to the late Prof. B. M. Das, the former Director and said that his death had created a great vacuum which cannot be filled in easily. He said that it is not sufficient if the research work conducted at the Institute by energetic and enthusiastic research workers is published in scientific, technical and non-technical journals, pamphlets and bulletins but these have to be disseminated to the tanning trade and industry by means of this Open House and practical demonstrations. He appealed to the tanners to go round the various sections of the Institute and see for themselves the work that is being done here and to give their impressions and suggestions. He said that with the goodwill and co-operation of the tanners, the Institute will be conducting practical demonstrations every month on each of the processes developed at this Institute.

Mr. N. M. Anwar, Hony. Secretary of the Southern India Skin and Hide Merchants' Association, associating himself with the function said that the tanning industry contributes foreign exchange to the national exchequer to the tune of Rs. 25 crores annually. He was pleased that the Government of India have devoted a lot of attention in the Second Five-Year Plan to the tanning industry and much of the credit is due to the dynamic personality of the Hon'ble Shri Jawaharlal Nehru, Prime Minister, who has been doing tremendous service for the scientific research in the country. In spite of progress through decades, he said that the tanning industry has been working on anti-diluvian methods of production. But now the industry is coming to toe the line and march ahead thereby contributing their share towards the national development. The Institute, he said, has been of great service to the tanning industry but the tanning industry has not taken full advantage of the researches developed at this Institute. He congratulated Dr. Y. Nayudamma for bringing about this Open House and practical demonstration thereby throwing open the doors of the Institute for the trade and carrying the techniques of science and research to the very doors of the tanning industry. He assured Prof. M. S. Thacker, Director-General, on behalf of the President of the Southern India Skin and Hide Merchants' Association that he would give all co-operation to see that the researches conducted at this Institute are applied in the E.I. tanning industry in order to augment the resources of our country and to earn twice or thrice the volume of foreign exchange the industry is gaining at present.

Mr. Sircar of Bata Shoe Company speaking on this occasion appreciated very much this move for 'Open House' and practical demonstration.

He said that the chrome retan process has been developed by U.K., U.S.A. and the Continent in order to get the qualities of feel, firmness of grain, lustre, brilliance and uniform covering. The tanners in those countries have solved the problem of improving the fullness and compensating for structural difference in the hide by introducing strong retannage over basic chrome tannage—upto the extent of 20% pure vegetable tanstuff. Today, this process is applied to all except calf willow and box in those countries.

With regard to footwear manufacture in India, he said that only 20-22 per cent of the population in this country are using footwear according to available statistics. So there is a great possibility of developing this trade in India and according to his calculation, even 5% increase of footwearing population will create employment for 10,000 people in tanning and shoe making trade.

Lastly, Mr. Sircar stressed on the necessity for improving the cattle wealth of the country. To improve our stock of hides, it is necessary to improve our type of breeding. The defects like pox and tick marks are no more a bar to produce good quality smooth upper leather, as these defects can now be overcome by the chrome retan process which has been developed after vast research by the Central Leather Research Institute and which is now to be demonstrated. So this process should meet with the appreciation of everybody.

Speaking on this occasion, Mr. G. S. Srinivasa Iyer said that this Open House has brought the tanning industry in closer touch with the Institute. He said one of the problems that the tanners are at present facing is to get a good bleaching agent. He requested that the Institute should take up this problem and come to the rescue of the tanners. About the achievements of the Central Leather Research Institute, he said that the work relating to the preparation of better curing agents and better methods of preservation of raw hides and skins will be a very useful one for the industry as it will improve the quality of the raw material. Regarding the substitutes for wattle bark from indigenous tanning materials, he said that it would be better if extracts of these tanning materials are made available as it would be easier to use extracts. He said that it would be very much appreciated by the

E.I. tanning industry if only methods are suggested for cutting down the period of tanning. He also said that there should be standardisation in tannage as there are nearly 300 tanneries and each is having its own mark. The E.I. tanning trade, he said, is becoming more and more uneconomic as almost all countries are independent and it is high time that the tanners diverted their attention from E.I. tanning to the finishing of E.I. tanned skins. He was confident that gradually in the course of a few years, they would be in a position to take over to finishing. He said that if all the people in our country were to use footwear, our production may not be sufficient to meet the demand.

Inaugurating the Open House and practical demonstration, Prof. M. S. Thacker paid a glowing tribute to the late Prof. B. M. Das for the greatest service rendered by him in this field. On behalf of the Council of Scientific and Industrial Research, he extended a very hearty welcome to all those present. He said there were now 17 research laboratories in the country and yet the help given by them to the industrialists was not considerable. The Institutes should not merely confine themselves to academic research but should contact industrialists, invite them to the laboratories, make them understand Government's problems and suggest what they should do. He was sure the Leather Research Institute at Madras had set itself to this task and their throwing open the laboratories to the trade for practical demonstrations was a right step. He appealed to the leather industrialists to enlist the services of the Institute in solving their problems and building up the leather industry in the State. He also stressed the need for co-operation of the tanning trade and industry and thanked the tanners for the co-operation they had extended to the Institute and appealed for their continuous support for their mutual benefit.

Dr. Y. Nayudamma then introduced Mr. John Dean, Glazed kid expert from U.S.A. who presented a set of technical books to the Central Leather Research Institute, Prof. M. S. Thacker accepted the gift from him with grateful thanks.

Shri N. S. Mani, Information Officer of the Institute, proposed a vote of thanks.

A STUDY OF THE EFFECT OF DIFFERENT VEGETABLE TANSTUFFS ON THE REORIENTATION OF FIBRE STRUCTURE OF PELT IN THE MANUFACTURE OF LEATHER (Part I).

B. C. BASU & S. K. MITRA

It has been the common knowledge of tanners for a very long time that in vegetable tanning the quality of leather is influenced to a large extent by the nature of tanning materials used. While the reasons for this variation in leather quality have not yet been clearly understood, it is believed that a number of factors are responsible for it. Whatever the reasons may be, the suitability of a tanning material used is judged by the physical properties of the final leather produced, because, it is the physical property only which enables the tanner to judge the suitability of his leather for various purposes. The physical properties which determine the quality of leather are the result of reorientation of the fibres in the pelt during tannage. Since a close relation exists between the physical properties of feel, flexibility, tensile strength, porosity etc. and the fibre structure of leather, it is obvious that a study of the effect of tanning materials on the fibre structure of the pelt and the resultant leather, which is the subject matter of this paper, would indicate which vegetable tanning material would be better suited for any particular type of leather and the condition of fibre structure reoriented thereof. Part I of this study is concerned with individual tanning materials whereas Part II deals with blended tanstuffs.

EXPERIMENTAL :

13 vegetable tanning materials, viz., Hopea, Avaram, Wattle, (Nilgiri), Goran, Wattle (Africa), Margineta, Babul, Arjuna, Whitevalem, Karada, Konnam, Divi-Divi and Myrobalan were taken for this study. All the tanstuffs were extracted at room temperature, varying beween 30°–33° C. Only the first extraction was taken in each case and the liquor was diluted to the experimental strength of 10° Bk. For this study, one cut piece measuring 4″ × 16″ was taken from the butt portion of a wet salted cowhide. Liming was done with 20% shell lime for a period of 12 days. To obtain uniformity, the adipose layer of the pelt piece was removed and cut down to uniform thickness by the splitting machine. The pelt was then delimed completely with 2% boric acid and subsequently washed free of the acid. The delimed pelt

was then cut into 13 equal pieces each measuring 1″ × 4″ and the pieces were treated separately with an equal volume of 10° Bk. liquor of the above tanning materials in bottle, the ratio of pelt to liquor being approximately 1 : 10. About 100 c.c. of an individual liquor was taken in each bottle and kept for 4 days with occasional shaking. Spent up liquor from each bottle was replaced on the 5th day by similar quantity of fresh liquor and kept for further 4 days, shaking being done as before. At the end of the experimental period the liquor was poured out and the tanned pieces were dried. Sections for microscopical examination were cut from all the pieces at a thickness of 40 μ and mounted in Canada balsam. The grain and total thickness of the leather pieces were determined with the help of an eye piece micrometer. The histological characteristics of the samples after treatment are tabulated in the Table I.

DISCUSSION :

It will be evident from the table that maximum grain and total thickness of the leather were obtained when the pelt was tanned with Hopea bark liquor whereas Myrobalan tanned leather showed minimum thickness, both in grain and corium. It will also be seen that the splitting up of the fibres in the case of Myrobalan tanned piece was at the minimum producing very thin fibre bundles. This is probably due to the fact that myrobalan liquor being highly acidic in character swells the pelt to a greater degree preventing the bigger tan particles to enter through the capillaries and reach the interfibrillary spaces thereby ; and because of high astringency of myrobalan liquor, its splitting effect on the fibres, which causes the grain and corium to increase in depth, is much less than those of non-astringent or less astringent materials like Hopea and Avaram. Large degree of splitting and consequently fuller fibre bundles were obtained in the case of Hopea tanned leather piece. Next in order came Avaram, Wattle, Margineta, Konnam, Babul, Goran, Karada, Arjuna and White Valem. So far as the total thickness of the leather is concerned, Hopea, Wattle and Avaram produced thicker leather while Myrobalan, Divi-Divi and Konnam produced comparatively thinner and emptier leathers. This thin and empty condition appears to be due to the inability of these tanning materials to prevent cohesion and coalescence of the fibres during drying and fill up the interfibrillary spaces. A large proportion of the water in pelt is present in capillaries between the fibres, and between their constituent fibrils. When this water dries out, the capillaries collapse, resulting in the loss of fibrous structure of the material.

In vegetable tanning this fibrous structure is maintained only when there is a proper deposition of the vegetable tannins between the fibres and fibrils, and the opened up fibre bundles maintain their fullness when the hide structure is filled with tan. The quantity of tannin deposition varies from one tanstuff to another. In the case of myrobalan and Divi-Divi this deposition appears to be more on the flesh and grain surface than in the layers in-between ; because, on the grain surface of Myrobalan and Divi-divi tanned leather pieces a yellow coloured deposition evidently due to bloom, appearing as an opaque layer under transmitted light was observed. This deposition on the other hand is likely to reduce the distensibility of the grain layer of the leather by causing the grain fibres to restick. The remaining tanning materials of the series produce leathers intermediate between the above two conditions.

As regards compactness of weave, Hopea, Avaram, Wattle and Margineta produced leather with compact structure. This is probably due to the less swelling of the pelt and the ability of these tanning materials to maintain opened up condition of the fibre structure and coat the fibres and fibrils efficiently with tans ; whereas Myrobalan and Divi-divi produced loose and spongy structure, probably due to the excessive swelling of the pelt and their inability to maintain this condition and fill up the inter-bundle spaces with tans. The remaining tanning materials of the series produced leathers in-between the two extremes.

As regards angulation, Myrobalan, Divi-divi, Arjuna and Goran tanned leathers showed high angle of weave. In the case of Myrobalan and Divi-divi, the high angle may be due to more acidic nature of their tannins which causes the collagen fibres to contract axially and increase in diameter thereby raising the angulation ; although Arjuna and Goran are less acidic, the high angle is probably due to their astringent nature, which also influences the angulation. It is also probable that these tanning materials accelerate quick drying which pulls up the angle of weave. Hopea, Avaram and Margineta appear to be less astringent in this respect as they produced medium angle of weave with fairly good amount of splitting up. Although a more or less similar structure was obtained with Konnam and White valem, the middle layer of the leather produced by them remained to be unopened indicating their inability to penetrate into the central layer and reorient the structure in an uniform way. The remaining tanning materials of the series produced leathers lying between the above two conditions.

Table I. Showing the Characteristics of Fibre Structure of Leather pieces.

S. No.	Tanning Materials used	Grain thickness of leather (mm)	Total thickness of leather (mm)	Angle of weave	Degree of splitting up	Regularity of pattern	Fullness of Fibre bundles	Packing of Fibre bundles	Merging of grain into Corium
1.	Hopea	0.43	2.365	Medium	Large & Fine	Regular	Full	Fairly compact & compact	Uniform
2.	Avaram	0.301	2.107	,,	,, (max.)	,,	,,	,,	,,
3.	Wattle (Nilgiri)	0.258	2.15	Medium & High	Large & Medium	Slightly irregular	Fairly full & Full	,,	Slightly poor
4.	Goran	0.258	2.15	High	Medium & small	Very irregular (broken bundles)	Fairly full & Thin	Fairly compact	Poor
5.	Wattle (Africa)	0.215	2.15	Medium & High	Large & Medium	Slightly irregular	Fairly full & Full	,,	Slightly poor
6.	Marginata	0.215	2 064	Medium	Large	,,	Fairly full	Fairly compact & compact	Fairly Uniform
7.	Babul	0.215	2.021	Medium & High	Medium	,,	Fairly full & Thin	Fairly compact	Slightly poor
8.	Arjuna	0.172	2.021	High	Medium & small **	Very irregular (broken bundles)	Thin	do	Very poor
9.	White-velam	0.172	1.935	Medium	do **	Very irregular (undertan)	,,	do	Poor
10.	Karada	0.150	1.935	Medium & High	Medium ***	Slightly irregular	Fairly full & Thin	do	Slightly poor
11.	Konnam	0.172	1.806	Medium	Large & Fine at Grain & Flesh layers, little amt. at Central layer	do	do	do	Fairly uniform
12.	Divi-divi (pods)	0.129	1.806	High	Mdm. & Small	Irregular	Thin	* Open Weave	Poor
13.	Myrobalan (nuts)	0.107	1.72	,,	Small	do	Very thin	* ,,	,,

* Maximum interbundle spaces were found in the case of Myrob. & Divi-divi tanned samples. Deposition of blooms especially on the grain & Flesh Layers and in some cases in the inter bundle spaces were found.

** Central Layer remained to be unopened with no indication of fine details, and had a low angle of weave.

*** Large and fine splitting up was noticed at the Grain Flesh layers but very little at the Central layer, which showed a low angle of weave.

As regards regularity of weave pattern and merging of grain into Corium, Hopea and Avaram were found to produce regular pattern and uniform merging, whereas irregular pattern and poor merging were obtained in the case of Arjuna, Goran, Whitevalem, Myrobalan and Divi-divi. The remaining tanning materials of the series produced leathers intermediate between the above two conditions. The regularity of the pattern and uniformity of merging appear to be influenced by the astringency of the tanning materials; highly astringent materials are likely to produce distorted pattern and poor merging. The distorted pattern caused by Arjuna and Whitevalem was due to their inability to penetrate into the central layer of the pelt.

On the basis of structural reorientation and physical conditions of leather fibres, the tanning materials under investigation may be grouped as follows:—

Group (1) Avaram, Hopea, Marginata and Konnam. (Producing medium angle of weave, large amount of splitting up, fairly regular pattern and uniform merging of grain into corium).

Group (2) Arjuna, Goran, White valem, Divi-divi and Myrobalan. (Producing high angle of weave, small to medium amount of splitting up, very irregular pattern and very poor merging of grain into corium).

Group (3) Wattle, Karada and Babul. (Producing medium to high angle of weave, medium to large amount of splitting up, slightly irregular weave pattern and slightly poor merging of grain into corium).

Although tanning materials are always used in blends, an inference subject to further investigations, may be drawn at this stage from the characteristics of the individual materials:

Group (1) appears to be mellow and is likely to produce softer type of leather like E.I. tanned skin.

Group (2) appears to be astringent and is likely to produce a firmer type of leather like sole.

Group (3) appears to be moderate and is likely to produce a type of leather intermediate between the above two extremes, *e.g.*, E.I. tanned kip.

The authors wish to express their thanks to Dr. Y. Nayudamma, Assistant Director-in-charge, C.L.R.I., for permission to publish this paper.

Microscopical Laboratory,
7-1-1957.

NOTE ON THE ESTIMATION OF SMALL QUANTITIES OF CHROMIUM BY DI-PHENYL CARBAZIDE

T. J. DEVASSY

In the course of attempts at estimation of the different chrome complexes present in chrome liquors through electrophoresis, need was felt for a reliable method of determining the small quantities of trivalent chromium fixed on filter paper. Di-phenyl carbazide is a well known reagent for estimating chromium. However the trivalent chromium has to be oxidized first to hexavalent form.[1] Hence quantitative conversion of Cr^{III} into the Cr^{VI} state has to be ensured for successful use of the above reagent. Several methods are available for oxidation of Cr^{III}. The following are the more important oxidants tried in this connection. (*a*) Hydrogen peroxide in alkaline medium,[2] (*b*) alkaline hypobromite solution,[3] (*c*) potassium permanganate in acid medium[4] and (*d*) perchloric acid.[5] None of these however was found to effect complete oxidation. A mixture of sodium carbonate and sodium chlorate[6] was tried and found to be quite satisfactory. The following procedure has been adopted with success.

1.0 ml. of 2.5% solution of basic chromium sulphate was spotted on a filter paper strip, the paper dried and ashed in a platinum crucible and the ash fused with the mixture of equal quantities of sodium carbonate and sodium chlorate (0.05 gm. each). This proportion of sodium carbonate and sodium chlorate being found to give the best results. The fusion is done very gently and carefully. After cooling the fused mass was dissolved in minimum amount of 2 N. sulphuric acid. After adding 5 ml. more of 2 N. sulphuric acid 2 ml. of 0.2% diphenyl carbazide solution in alcohol was added, the whole well mixed and made up to 50 ml. The absorption coefficient of the solution was read by a Beckman spectrophotometer.[(1)] The amount of chromium was read off from a standard curve. The method gave consistant and accurate results.

Author's thanks are due to Dr. Y. Nayudamma, Assistant Director-in-charge, for his permission to publish this Note.

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CLASSIFIED ABSTRACTS

RAW MATERIALS

HIDE INDUSTRY TAKES UP A NEW STEP FORWARD. *M. A. Delph Co. Lea. & Shoes* **132**, 17, 12, (1956). A new method of preparing hides for shipment has been developed and put into practice. In the new process, the hides are fleshed and trimmed thus decreasing the unwanted weight considerably, thus saving in freight. The manure, dirt and other substances are removed by means of air and water under high pressure. The fat and meat are removed and processed as pet food. The hides thus prepared are free from smell, dehairs better, soaks overnight and requires less washing.

V. V. S.

THE SKIN AND LEATHER OF MARINE ANIMALS. V. EXPRESSIBLE WATER IN SHARK SKIN. *Toyoo Takahashi. Bull. Japan Soc. Sci. Fisheries*, 18, 341-8 (1952-3) ; *Chem. Abstr.* 50, 3786g (1956). *Via. J.A.L. C.A.* **51**, 5, 263, (1956). When green shark skin was pressed, the relation between expressible water (W), pressure (P), and initial water content (W_0) was found to be : $dW/dP\ K(W_0-W)/P$. The curve had an inflection point at P = 5-7 kg., and the skin became transparent at nearly the same pressure. Methylene blue dissolved easily when placed on fresh skin (70-80% water), but not when placed on the pressed, transparent skin (about 45% water). The same equation held for moist cotton, but here there was no inflection point. The water expressed at pressure below the inflection point seems to be present between the fiber bundles, and that expressed above the inflection point seems to be present in the interfibrillary spaces within the bundles.

LEATHER FROM PACKING HOUSE PIGSKINS. *Anon. Rohm and Hass Reporter*, 14, *No.* 1, 7-11 (1956). *Via. J.A.L.C.A.* **51**, 5, 263, (1956). Although the 70 million hogs slaughtered annually in the United States are said to represent potential raw material, for half a million square feet of leather, very few of these skins reach the tanneries, and then only as narrow strips, because hand flaying is prohibitively expensive. A machine has been developed for flaying half carcasses, yielding skin pieces averaging 3½ square feet, uniform in thickness and free from bristles. One tannery is said to be receiving 100,000 lb. of this stock weekly, and may produce 10 million feet of pig leather this year.

RESISTANCE OF PURIFIED COLLAGEN TO DEGRADATION BY SALT-TOLERANT BACTERIA IN PURE CULTURE. *A. L. Everett and T. C. Cordon. J.A.L.C.A.* **51**, 2, 59, (1956). Salt-tolerant and halophilic bacteria were isolated from salted hides. Those cultures able to liquefy gelatin were tested for solubilising activity on limed and unlimed collagen. A modified chemical method was used to sterilize the collagen pieces without apparent alteration of properties. Bacterial degradation was measured by colorimetric estimation of the proportion of hydroxyproline in soluble form after suitable incubation.

Results were obtained for single cultures as well as various combinations of pooled mixtures. In general the unlimed or "native" collagen proved extremely resistant to attack, while many of the strains were moderately active on the limed material. In only a few cases, selected culture mixtures appeared to degrade both forms of collagen. Other tests with organisms adapted to salt tolerance showed the flexible nature of this adaptive property, and the effect of salt on their collagen-solubilising activity. It was concluded that synergistic activity may well account for bacterial damage under curing conditions, and that alkaline denaturation greatly increases the susceptibility of collagen to bacterial attack.

PROCESSES PRIOR TO TANNING

THE CONTRIBUTION OF SOAKING ASSISTANTS TO SIDE LEATHER QUALITY. *Robert M. Lollar and C. David Wilson. J.A.L.C.A.* **51**, 5, 206, (1956). A carefully controlled test, employing 44 matched pairs of sides, was performed to determine the relative effects of sodium polysulfide and sodium hydroxide, used as soaking assistants, on the quality of elk side leather. The use of sodium polysulfide resulted in a slight but statistically significant decrease in the strength of the leather. Possible reasons for this effect are discussed.

THE DISTINCTION BETWEEN COLLAGEN AND KERATIN IN LIME LIQUORS. *D. Wegerle and H. Zahn. Das Leder*, 6, 298 (1955). *Via J.A.L.C.A.* **51**, 5, 258, (1956). In leather manufacture the source of dissolved protein decomposition products in lime liquors is of considerable interest. Components of the epidermis are expected but the occurrence of collagen fragments points to an undesirable attack on the corium. Formerly, distinction between decomposition products of collagen and keratin was not possible, but now it can be made chromatographically if their amino acid composition differs. Data from the literature show that there is 14% hydroxyproline in collagen, none in wool (keratin); 11.3% cystine in wool, none in collagen; 6.4% tyrosine in wool, 0.9% in collagen. The ratio of glycine to serine is 10 to 1 for collagen and 0.55 to 1 for wool. The following materials were prepared and examined: A. 100 ml. of calfskin enzymatic lime liquor containing sodium hydroxide and sulfhydrate was evaporated at 90° and dried. It contained 862 mg. of dry matter and 296 mg. of protein per 100 ml. B. 500 ml. of the above liquor was dialyzed against water, and acidified to pH 3. The precipitate contained 66 mg. of protein. C. The filtrate from B. was concentrated in a vacuum to give 232 mg. of dry matter. D. Precipitated material obtained by adding 20% trichloroacetic acid to filtered lime liquor A. until the pH was lowered to 3-4. E. Precipitate formed by bringing a dialyzed lime liquor to pH 7. F—H. Grain-free split material was limed for 50 days at room temperature after which the liquor was filtered to give a cloudy, yellowish liquid containing 0.53 g. of protein per 100 ml. of solution. 500 ml. of this liquor was dialyzed against water for 3 days with 3 changes of water. The pH of the dialyzate was 8. F. 250 ml. of this liquor was acidified to pH 5. A jelly-like precipitate formed that contained 60% of the total protein. G. 250 ml. of the liquor was acidified to pH 5, then all (precipitate and liquid) was dried. H. 100 ml. of lime liquor from the split material without dialysis was concentrated at 35° to 10 ml. J. Normal calfskin lime liquor containing sodium sulfhydrate was neutralized. After extraction of the precipitate with sodium hydroxide, the protein was precipitated isoelectrically, reprecipitated, then dried at 35°. For identification by means of 2-dimensional, 6-day, paper chromatograms, 100 mg. of material was hydrolyzed with 1 ml. of water. The first solvent was secondary butyl alcohol, 75 parts; 90-per cent formic acid, 15 parts; and water, 10 parts. The second solvent was 80-per cent phenol. Preparations A, B, C, D and J consisted principally of keratin as the chromatograms showed spots for tyrosine and cystine, none for hydroxyproline and spots of approximately equal size for serine and glycine. Preparations F and G showed hydroxyproline spots, none for cystine or tyrosine and a larger spot for glycine than for serine, thus indicating these preparations contained chiefly collagen. Preparation E. contained hydroxyproline and no tyrosine but also cystine and approximately equal amounts of glycine and serine; it was therefore collagen mixed with keratin. Preparation H. was not hydrolyzed; the chromatogram had ninhydrin-positive spots that were partly free amino acids (glycine, alanine, etc.) and partly lower peptides. The results show that the usual short, sharp lime dissolves only components of the epidermis and hair. A long-time liming in white lime dissolves collagen. Bowes (Biochem. Jour., 43, 365; Research, 4, 155) found that 5-10% of the collagen dissolved when oxhide was treated for 14 days at 20° in a lime liquor containing caustic soda to give a pH of 13.3. The dissolved collagen was present, partly as large molecules which precipitated on neutralization of the solution and partly as amino acids and lower peptides. These observations are confirmed by the present work. Bowes, Elliot and Moss (in Nature and Structure of collagen by J. T. Randall, p. 199) reported that on treatment of collagen with alkali a material dissolved that contained very little hydroxyproline but a relatively large amount of tyrosine. They however did not consider the cystine content or the glycine to serine ratio. In the present work the grain-free split was essentially collagen. The isolated protein fraction (preparations F. and G.) gave a typical collagen chromatogram in which tyrosine was absent and hydroxyproline strong.

LIMING OF ANIMAL SKIN. III. SULFUR COMPOUNDS PRODUCED IN LIME LIQUOR. *Harukazu Toyoda. Repts. Govt. Chem. Ind. Res. Inst., Tokyo*, 48, 277-87 (1953); *Chem. Abstr.* 50, 591g (1956). *Via. J.A.L.C.A.* **51**, 5, 258, (1956). Rabbit hair was immersed at 25°C. for 1 to 20 days in 0.2N NaOH or Ca $(OH)_2$ suspension, alone or with 1 per cent monomethylamine or 0.02 M Na_2S, and the hair and liquor were analyzed periodically for total N and total S and its compounds. The keratin dissolved from the hair by the alkaline treatment was found to decompose rapidly within 24 hours, and then to be oxidized successively in longer time to sulfide, polysulfide, sulfite, and thiosulfate. All these compounds except sulfite showed depilatory action when added to lime liquor. *IV. Depilatory action of Dimethylamine.* Ibid, 48,288-97.—Mono—and dimethylamine (but not trimethylamine) were depilatory. The depilatory action of dimethylamine was accelerated with higher concentration and temperature, independent of the ratio of liquor to skin. The acceleration was continued even when the skin was dipped for a short while in a lime liquor containing dimethylamine, and then transferred to a plain lime liquor, but not when the skin was pretreated with lime liquor alone and then transferred to the liquor containing dimethylamine. Addition of inorganic acids weakened the depilatory action, and that of Na_2S

strengthened it. Aqueous Ba $(OH)_2$, at pH below 12, was hardly depilatory, but ammonia, and especially mino—and dimethylamine were depilatory even at lower pH values. With higher concentrations or longer immersion the depilation became difficult because of the constriction of the follicles by swelling. *V. Action of dimethylamine on hide and hair.* Ibid., 48, 298-302. — Dimethylamine added to lime liquor did not markedly affect the hydrolysis of hide but caused its swelling, however slightly, and its softening by the separation of collagen fibres. The dimethylamine was absorbed rapidly by the hide to an equilibrium at about 15 per cent, but did not appreciably affect the saponification of the fat of the hide (in the usual concentrations), nor did Na_2S. The hydrolysis of hair was increased with higher concentrations of dimethylamine at higher temperatures in longer liming time, and its solubility in alkali was increased with higher concentrations of dimethylamine relatively independent of the liming temperature and time.

VEGETABLE TANNING

THE REACTION BETWEEN IRON SALTS AND TANNINS FROM THE CHESTNUT (CASTANEA SATIVA SCOP). *G. Thomas and J. Brossard. Chem. & Ind. No.* 20, 440, (1956). The role of various factors giving rise to black discoloration of tannins in chestnut (Castanea sativa scop) is studied spectro-photometrically by measuring the blue colour given by the reactions between phenolic acids isolated from chestnut and iron chloride. The instability of the blue colour which hinders its colorimetric measurements is stabilized for many hours by use of a phthalic acid-sodium phthalate buffer. The absorption curves for iron phenol and iron gallic acid compounds are given. The decolorizing action of Sn. $^{++}$ and Sn $^{++++}$ ions and of a number of compounds which could be used to prevent the black coloration is studied.

K. S. R.

NOTE ON THE CHEMISTRY OF BLACK WATTLE TANNINS. *Acetyl values, criteria of purity and molecular weights. D. G. Roux and S. R. Evelyn. J.A.L.C.A.* **51**, 2, 50, (1956). Some aspects of the work of Putnam and co-workers on wattle polyphenols (tannins) are critically examined.

Paper chromatography is used to show that Putnam and Gensler's "purified" wattle polyphenol (tannins), as supplied by them, contains sugars but no gums. Two-dimensional paper chromatography shows that a similar mixture of polyphenolic compounds or tannins is present, as was previously found in wattle fresh-bark extract. Putnam's single formula for wattle tannins is, therefore, untenable.

Accurate molecular weight estimations, in which the possibility of anomalous values is excluded, show that the polyphenols present in the same sample have an average molecular weight of 1270 13. This value is more than double that of Putnam's $C_{3}0H_{26}O12$ formula (M.W. 578.5), as well as that calculated from his molecular weight determination on fully acetylated tannins.

Proof is provided that the alkaline hydrolysis technique, as applied by Putnam, gives erroneously high acetyl values on fully acetylated black wattle. "Peracetylation" claimed by Putnam does not occur, and in

the known absence of keto groups this reaffirms the presence of a high proportion of either linkages in wattle polyphenols previously claimed by Roux.

All the above findings suggest that complete revision of the work by Putnam and co-workers is necessary.

THE CHEMISTRY OF VEGETABLE TANNINS. XIV WATTLE. *Robert C. Putnam. J.A.L.C.A.* **51**, 4, 169, (1956).

1. Wattle tannin has been purified. The product has not been shown to consist of a single component.

2. The mobility of the purified tannin has been measured. This may be used as a means of identification. If the purified tannin consists of more than one component, then either the components form a complex or the individuals have practically the same mobilities. This points to similarity of structure, possibly stereoisomers or positional isomers. The flavpinacol type of structure allows of several stereoisomers. Those which are not enantimorphs should be separable by chromatographic means.

3. The purified tannin sample was obtained completely free of ash and acetyl impurity.

4. The presence of a small percentage of water not removed by ordinary methods of drying can be shown by the Karl Fisher Method.

5. Increase in molecular weight with aging in a solvent has been demonstrated for quebracho and may be assumed probable for wattle. Molecular weight measurements in camphor and solvents on derivatives of wattle by the author agree. If the sample is complex, they represent an average value. Isomers would have the same value.

6. Passage of the tannin through cellophane puts on unknown upper limit on its molecular weight. It is probable that high polymers are not present.

7. Experimental determination of the molar refraction gave a value in reasonable agreement with that calculated from refraction equivalent based on a flavpinacol structure. Stereo or positional isomers have the same calculated value.

8. Surface tension measurements indicated the absence of any strongly surface-active component.

9. The molecular volume agreed with measurements made on the structure assumed. A possible layout of the model favouring dimerization was postulated.

10. Acetylated and methylated derivatives were prepared. Empirical and structural formulas were assumed for wattle and its derivatives. If wattle is complex, but the components are merely stereo or positional isomers, the assumptions are allowable. If the components differ in

other aspects, the structures are invalid, but the degree of acetylation and methylation are significant.

11. Infrared data agree with the analytical work on wattle and its derivatives.

OTHER TANNAGES

A COMBINED SOLVENT EXTRACTION AND TANNING PROCESS. *C. W. Beebe, J. S. Rogers, and M. V. Hannigan. J.A.L.C.A.* **51**, 5, 245, (1956). Dehaired hides were tanned, without preliminary dehydration, with a suspension of solid tanning material in acetone. The wet hides provided enough water to effect solution of the tannin. This system eliminates two steps of other solvent tanning systems : the dehydration of the pelt and the preparation of a tannin solution in the solvent. The results of small-scale tanning tests are promising.

RED SPOTS ON CHROME LEATHER. *H. Bartram and C. Riess. Das Leder*, 6, 219, (1955). *Via. J.A.L.C.A.* **51**, 5, 262, (1956). Chrome-tanned, split, cattle-hide leather from overseas was found upon receipt to be covered with red spots. The spots averaged about 1 cm., in diameter and extended entirely through the leather from grain to flesh. The spots were caused by a mold of the Monoverticillium group and the Penicillium family. It resembled the Catenularia Grove family, but could not be identified as C. *fuliginea synp. simplex.* Its morphology is given. It was isolated on acid wort agar and grew at either 20° or 30°C. It could be transferred to normal chrome leather where it formed red spots in 8 days which increased in intensity for 2 or 3 weeks. It could also be grown on vegetable leather and filter paper in a humid chamber at 20°, but not at 30°C.

TANNING STUDIES WITH EPOXY RESINS. *E. M. Filachione & E. H. Harris, Jr. J.A.L.C.A.* **51**, 4, 160, (1956). Epon 562, an epoxy resin which is commercially available, was found to interact with cowhide and calfskin in aqueous systems to produce a tanning effect. Little if any reaction or tanning appeared to take place in the pH range below about six. High pH seemed most suitable for this reaction as regards the rate at which maximum Ts and reversibility of shrinkage are attained. Treatment with Epon 562 in sodium carbonate, magnesium oxide, or lime water in the presence of sodium sulfate gave the best results. Suitable leather products were obtained from cowhide in one to three days (Ts 80-85°C) and from calfskin in less than one day (Ts about 85°C). The leather exhibited the unusual property of reversible shrinkage with no visible damage to leather appearance after shrinkage.

TESTING

RECOMMENDED METHODS FOR THE ANALYSIS OF TRADE EFFLUENTS. METHODS FOR THE DETERMINATION OF CHROMIUM, LEAD AND SELENIUM. *Prepared by the Joint ABCM — S.A.C. Committee on methods for the analysis of trade effluents.* Detailed methods of estimation of schromium, lead and selenium have been described. Methods for the determination of total chromium and chromium present as chromate have been given detailing the specifications of the reagents used. The chromium present is oxidised to chromate which is

colorimetrically determined as the violet coloured complex with diphenylcarbazide. The chromate present in the effluent is directly determined colorimetrically as the violet coloured complex with diphenylcarbazide. The methods are applicable for Cr. contents upto the range of 20 wg.

V. V. S.

A PAPER CHROMATOGRAPHIC ANALYSIS FOR COLLAGEN AND COLLAGEN DERIVATIVES. *James M. Cassel. J.A.L.C.A.* **51**, 5, 223, (1956). Collagen was completely hydrolyzed with hydrochloric acid. After this treatment, 18 amino acids were quantitatively separated from the hydrolysate by two-dimensional paper chromatography. The paper (Whatman No. 1) was irrigated in one direction with a mixture of methyl alcohol, pyridine, and water, and in the other, with mixed tertiary butanol, methyl ethyl ketone, diethylamine, and water. Residual diethylamine was removed from the paper by steam distillation at approximately 75°C. The spots of individual amino acids were revealed by the colour produced when treated with ninhydrin. They were cut out, after which each coloured amino acid derivative was dissolved and its optical density determined with a spectrophotometer. The analysis of collagen agrees well with the generally accepted literature data. Specific colorimetric tests for tyrosine, phenylalanine, and hydroxyproline were used to obtain comparative data for these amino acids.

A SIMPLE METHOD FOR DETERMINING TANNING AND COMBINING VALUES. *G. Reich. Das Leder*, 6, 228 (1955). *Via. J.A.L.C.A.* **51**, 5, 259, (1956). The Stather-Herfeld method for determining tan and combining values (see *Jalca*, 47, 629) has the following faults : (a) no correction is made for untanned hide powder dissolved and lost during washing ; (b) temperature during shaking is not controlled ; (c) washing may be incomplete because of channelling ; (d) drying the powder is very slow, requiring about a week ; (e) the results with hide powder do not agee with those found in practice. The following method is proposed : Tan in a 3-neck flask provided with a stirrer rotating at 150 rpm. Immerse the flask in a water bath regulated to 20°C. Instead of hide powder use 1-cm. squares of acetone-dehydrated calfskin prepared by the method of Naumann (Jalca, 49, 125) ; this material does not require washing before use. Soak a quantity of hide containing 2g. of hide substance for 2 hours in 50 ml. of water, then add 20 ml. of 6% tannin solution and, at hourly intervals, two 15 ml. portions of the tannin solution. Tan for 24 hours, then remove an aliquot for analysis. Wash the leather in the flask by passing 3 litres of water, at the rate of one litre per hour, in through one of the necks and out another, closing the latter with a screen to retain hide pieces. Collect the wash water. Centrifuge, dry, and weigh aliquots of the tannin solution, the detanned solution, and the wash water, and from these calculate tan (TV) and combining (CV) values. Air dry the hide material for further investigation. The pieces make possible a good evalution of leather quality. This method gives reproducible results that are available in 48 hours and can be used for control work. Some typical results by the old (Stather-Herfeld) and the new methods are shown in the following table for laboratory-prepared syntans and other tanning materials.

Tanning materials	Old method		New method		Shrinkage Temp. °C
	TV	CV	TV	CV	
Sulfonated Novolak	65	41	41	31	78
Condensed dihydroxidiphenyl sulfone and sulfite waste liquor	65	32	47	43	68
Sulfited Novolak and sulphite waste liquor	58	31	39	35	68
Auxiliary syntan	43	16	36	18	68
Sulfite waste liquor	47	24	27	25	67
Spruce extract	72	51	60	54	80
Quebracho extract	104	63	65	56	86

By the new method there is a large difference between the TV and CV values for the auxiliary syntan. For the sulfite waste liquor the difference is small, because the TV value is low. Shrinkage temperature is low if sulfite waste liquor is present. The take-up of an aromatic tannin depends on salt formation, activity of dipoles, or formation of hydrogen bonds. The greater the tendency is to form salts, that is, the more the tannin resembles an auxiliary tannin, the lower the pH value for maximum TV and CV values, as is shown in the following table.

Tannin	pH 2·0		pH 3·5		pH 4·5	
	TV	CV	TV	CV	TV	CV
Spruce extract	61	58	59	54	56	50
Sulfonated Novolak	43	36	41	31	40	31
Auxiliary syntan	38	27	36	17	24	14

In a test with mixtures of a replacement syntan and sulfite waste liquor, it was found that quality decreased only when 40 per cent or more of sulfite waste liquor was used.

PHYSICAL PROPERTIES OF FATLIQUORED AND OF SOLVENT EXTRACTED LEATHERS. *Victor Mattei and William T. Roddy. J.A.L.C.A.* **51**, 2, 67, (1956). Past experiments made on the influence of fatliquoring on the physical properties of leather can be questioned from the standpoint of statistical principles. As a basis for studying and clarifying the influence oil has on the physical properties of leather, statistically designed experiments were carried out comparing the physical properties of fatliquoring leather to solvent extracted leathers. Such physical tests as tensile strength, stitch tear strength, tongue tear strength, ball burst strength and hystersis curves were conducted and the data

analysed. A discussion of the results is presented and emphasis placed on those tests that best distinguish what the fatliquor does to the leather.

POLYEPOXIDE RESIN SYSTEMS, THEIR CHEMICAL REACTIONS AND PHYSICAL PROPERTIES. *M. G. Ivinson (Miss), F. M. Karpfen and B. R. Howe. Chem. & Ind. No.* 29, 756, (1956). The polyepoxide resins are derived from condensation products of phenols and formaldehyde and both novolaks and resoles may be used. Reaction of the alkali metal salts of these materials with epichlorhydrin yields resins with a plurality of epoxide groups, the number depending on the molecular weight of the novolak or resole employed.

The polyepoxides are distinguished from the more conventional diepoxide resins derived from diphenylolpropane and epichlorhydrin, by their ability to cross-link with mono-primary amines in the unmodified state and the ability to cross-link with high functionality reagents after modification through some of the epoxide groups. The polyepoxide resins are also distinguished by their solubility in hydrocarbons to give solutions of low intrinsic viscosity.

GENERAL

THE ADHESIVE PROPERTIES OF EPOXIDE RESINS. *N. A. de Bruyne. Via. Chem. & Ind. No.* 29, 760, (1956). The special value of epoxy resins as adhesives lies in their polar character, in their small shrinkage and their property of hardening without evolution of volatiles.

The most direct method of measurement of adhesion, making tests of joint strengths, generally fails to give decisive information on the origin of interfacial forces responsible for the existence of the adhesion and an attempt was made to investigate these forces by a less direct route.

A number of epoxy resins were made and the influence of various features of molecular structure on the collapse pressure of films spread on water was studied using the Langmuir trough technique. It was found that the hydroxyl group greatly influences the adhesion. The resin monolayer probably lies with the hydroxyl groups in the water to which they are attracted by hydrogen bonding. One would expect similar orientation of the resin at surfaces such as cellulose, metals covered with oxide skins and glass.

A number of different epoxide resins were investigated as adhesives in lap joint tests using phthalic anhydride as hardener. Breaking stress showed a statistically highly significant correlation with hydroxyl content of cured resin. Until the effect of shrinkage stresses can be evaluated, however, this correlation cannot be presumed to be a direct result of interfacial forces emanating from the hydroxyl groups. Shrinkage was, in fact, found to decrease with increasing hydroxyl content of the cured resin.

SOME ASPECTS OF THE CHEMISTRY OF EPOXIDE RESINS IN RELATION TO APPLICATIONS. *P. Bruin. Via. Chem. & Ind. No.* 29, 760, (1956). A sound knowledge of the structure, reactivity, and curing

possibilities of epoxide resins is essential in order to bring out the typical excellent qualities of these materials. Curing is possible by (a) polymerization via the epoxy groups, (b) reaction with special polyfunctional compounds. For the former type of reaction, which is of a catalytic nature, special compounds containing secondary or tertiary amino groups are generally used. The number of epoxide groups that are linked together under their influence is very limited and to ensure proper cross-linking it is necessary to use epoxide resins of low molecular weight.

The reactions referred to under (b) above involve the use of compounds which contain a number of active hydrogens which can react with epoxy groups, such as aliphatic di—and poly-amines and aromatic amines such as m-phenylene diamine. These compounds give excellent curing with high as well as low molecular weight epoxide resins. Aromatic amines give a slower reaction with epoxy groups than aliphatic amines and cured products with higher heat distortion points are obtained by their use. Epoxide resins may be cured with phenol formaldehyde resins but to ensure proper cross-linking, it is important that the reaction of the epoxide resin with the phenol formaldehyde resin via the epoxy and phenolic hydroxyl groups and that between the molecules of the phenol formaldehyde resin via the methylol groups are to some extent made to harmonize. An unduly rapid reaction between molecules of the phenol formaldehyde resin deprives molecules of epoxide resin of the opportunity to become incorporated. Such a situation can be avoided by appropriate modification of the phenol formaldehyde condensate used.

SOME CHARACTERISTICS OF EPOXIDE RESIN SYSTEMS. *F. J. Allen and W. M. Hunter. Via. Chem. & Ind. No.* 29, 756, (1956). Methods of modifying the commonly-used aliphatic polyfunctional amines in order to widen their range of application were studied. Modification with acrylonitrile gives a range of low viscosity hardeners of varying reactivity which are extremely useful in all types of casting, laminating and adhesion applications and in particular for use in the manufacture of press tools, jigs and fixtures. Modification with ethylene oxide gives somewhat faster setting products which again have a wide range of application. The reduced toxicity of the acrylonitrile modified hardeners and in particular the negligible toxicity of the ethylene oxide types are important steps in the production of amine hardeners which are more suitable for use in industrial applications.

STUDIES ON LEATHER BY MEANS OF A SONIC TECHNIQUE. *Joseph R. Kanagy and Myron Robinson. J.A.L.C.A.* **51**, 4, 174, (1956). Nondestructive studies utilizing measurement of the velocity of sound through leather have been made. It is shown that sound velocity varies substantially with changes in chemical and physical structure and particularly with fiber orientation. Accordingly, velocity measurements are indicative of modifications of the fibrous order produced by strain, aging, and filling. There is good correlation with the results of tensile and breaking elongation tests. The effects of tannage, grease, and moisture can also be demonstrated. Hide-to-hide and point-to-point variations are extensive and several simultaneous factors influencing velocity are usually not readily distinguishable.

The speed of sound through leather increases with period of aging at 100°C. until it reaches a maximum. Therefore, the proximity of a sample of leather to the maximum may indicate its quality. For an inhomogeneous material such as leather the sonic technique has the distinct advantage of providing a means of following the effects of aging, chemical treatments, and the like on a single specimen.

SOME ASPECTS OF THE PROPERTIES OF LEATHER FROM THE SHOE MANUFACTURING POINT OF VIEW. *Dr. E. Baumann. J.A.L.C.A.* **51**, 3, 88, (1956). Leather most of which is produced goes into shoes is still one of the most important raw materials for the shoe industry and hence this industry is highly interested in every development that takes place in leather industry. It is a wrong opinion that synthetic products are likely to throw leather out of market. Since the increase in cattle population does not keep pace with increase in men, the result is shortage of leather and synthetic products are necessary to fill a gap in supply of leather. By virtue of the unique structure of hide and leather, no imitation has been possible to compete with leather.

While commending on the scientific advancement, the tanning industry has achieved in the last few decades, the author feels that the leather science is lacking a sufficiently sound practical foundation and what is needed is a bridge from science to practical tanning.

The importance of some properties of leather from the angle of shoe industry is discussed. The properties are assembled in 3 groups, (a) properties which are important to manufacturing and durability of shoes in wear, (b) properties responsible for the amount of comfort of the feet of the wearer and (c) properties responsible for a good presentation of the shoe during wear. Factors that contribute to the above properties are (a) mechanical properties, tensile strength, tear-resistance, stretchability, plasticity, grain strength and stretch, resistance against continuous flexing, abrasion resistance, resistance against bending and suitability for cementing process. *Group B* : Flexibility, permeability for water vapour, permeability for air, water-proofness, thermal conductivity, condition of surface and freedom from substances causing irritation of skin. *Group C* : Fastness to light, fastness to dry and wet rubbing and bleeding, fastness to action of water resistance against action of perspiration, resistance against action of micro organisms, suitability for easy ' make up ', freedom from substances causing spues on leather.

The above requirements are reviewed and suggestions are made for improvement of the same.

V. V. S.

THEORIES

THE CRITERIA OF TANNING ABILITY AND SOME UNCOMMON TANNAGES. *Prof. D. Burton, The Chem. Age.* **76**, 1923, 1135, (1956). (Paper read at a meeting of the Northampton Group of S.L.T.C.). The future would bring many new tanning materials, and the problem of judging their tanning ability would arise. Theoretically the criteria of tanning ability could be stated as :

(1) Resistance to putrefactive and other micro-organisms. Proteolytic enzymes, such as trypsin, hydrolysed some leathers but not others.

(2) Stability to heat. In this connection Chater and Briggs developed the shrinkage temperature technique. Standard figures for the Ts of leather were still required. Under the electron microscope the first indications of degradation generally occurred at temperatures below the Ts.

(3) Stability to water. The nitrogen content of the water extract was a measure of the stability of the tanned collagen.

(4) Effect on the physical properties of hides and skins. These are primarily determined by sound unit fibrils and retention of the fibre structure without too much removal of mucoid matter. In practice, the following must also be considered : (i) colour, (ii) weight-giving properties, (iii) area yield and (iv) stability to atmospheric conditions, light and various chemicals.

Tanning abilities : The tanning abilities of the elements in relation to their positions in the periodic table have been investigated by Dr. H. P. Chakravorty using the Ts. and the formation of leather-like products as criteria. In general the pH of maximal metal fixation is closely related to the pH at which the hydroxide or basic salt is precipitated and the maximum Ts. is given by pelt tanned at this pH value.

The salts of copper, silver, magnesium, zinc, cadmium, yttrium, lanthanum, cerium, neodymium, tin, lead and manganese have no tanning ability. The salts of berryllium, titanium and thorium are worth further investigation. The effects of acetic acid, sodium acetate and sodium hydroxide on the tanning ability of mercuric acetate were described. A basified solution of mercuric acid gives a Ts. of 91°C, but its commercial possibilities either alone or in a combination tannage are limited by its cost, poisonous character, and liability to blacken in air.

Chlorine rapidly combines with bates pelt to the extent at least six per cent on the dry weight. Small quantities reduce its Ts. to values of 34°C and below. It becomes swollen and horny when dried. Its use in soak liquors is dangerous especially at temperatures above 15°C. Sodium hypochlorite causes drawn grain with bated pelt. Bromine increases the Ts. of bated pelt from 61°C to 64.5°C. Iodine gives a maximum Ts. of 62.5°C. The halogens combine to a smaller extent with deaminized hide powder than with untreated hide powder showing that the reaction is with the amino group.

THE EFFECT OF WETTING AND EMULSIFYING AGENTS AND FAT LIQUOR PRODUCTS ON THE WATER ABSORPTION OF LEATHER. *H. Herfeld, G. Weigand and K. Schmidt. Ges. Abhandl. Deut. Lederinsts. Freiberg/Sa., No.* 11, 35-59 (1955). *Via. J.A.L.C.A.* **51**, 6, 355, (1956). The effect of wetting agents on water uptake of leather was studied with vegetable-tanned and cr-tanned calfskin. Wetting agents were added at the following operations : (1) in soaking, 0.0, 0.25, 0.75 or 1.5% Pekorol LM ; (2) in liming, same as in (1) ; (3)

in vegetable tanning, 0.0, 0.1, 0.25 or 0.5% Smenol V (not added in Cr. tanning) ; (4) in fat-liquoring, 0.0, 0.2, 0.4 or 0.8% Smenol WO conc. paste ; (5) at all the above stages successively, using the minimum, intermediate, or maximum percentages of the above agents at each stage. Determinations of wetting time and water uptake in 2 and 24 hrs. were made after drying. The use of the minimum amounts of the wetting agents at any one stage had a negligible effect on wetting time or water up-take, but use of more than the minimum amount at one stage, or of the minimum amounts at all stages, increased the wettability very distinctly. The effect was more marked for Cr. leather than for the inherently wettable vegetable leather. The only effect noted on the composition of the leather was an increase in the ratio of "bound" to total fat for leathers fat-liquored in the presence of the wetting agent.

Eight commercial anionic fatliquors were analysed for emulsifier and emulsified oil by the Panzer-Niebuhr method (see JALCA 48, 328 (1963), but extracting the petroleum ether layer three times with 50% alcohol. The method was found applicable to cationic as well as anionic fatliquors. The extracted emulsifier was analyzed for organically combined SO_3, and the Drop Numbers of 0.2% solutions of the emulsifiers were determined. The emulsifier varied from 7 to 88% of the total oil, combined SO_3 in the emulsifier varied from 5.5 to 44%, and the Drop Numbers from 65 to 82 (water = 40). Pieces of neutralized Cr. leather were fatliquored with each of the 8 products, and tested after drying for wetting time, water uptake, and water transmission coefficient. The two leathers fat-liquored with products that were very high in emulsifier and in combined SO_3 were much more wettable than the other six, which differed little among themselves. Further tests using blends of sperm oil with varying amounts of different emulsifiers showed that the kind of emulsifier used had more effect on the wettability of the leather than the amount of emulsifier, and that the kind of raw oil that is emulsified also plays a role. For sulfated oils, the wettability increased with the per cent of SO_3 in the emulsifier. Six cationic fat liquors contained from 8 to 51% emulsifier. Drop Numbers of 0.15% solutions of these emulsifiers varied from 49 to 77. Application of these cationic fat liquors to Cr. leather resulted in low and erratic oil takeup, and high and erratic wettability. Application after an anionic fat liquor resulted in good oil takeup, and improved resistance to wetting (though still inferior to results obtained with anionic fat liquor alone). Application following treatment with a syntan improved the oil takeup but not the resistance to wetting. When cationic and anionic fat liquors were applied to vegetable leather, the former gave much better oil takeup and much greater resistance to wetting than the latter. Since the effect of a fat liquor on the behaviour of leather toward water cannot be predicted with certainty from analysis, the authors propose the determination of "Water Absorption Number" of fat liquors by the following method : A. 30-g. charge of air-dry calfskin squares (limed, unhaired, bated, and dehydrated with acetone) is soaked back, Cr-tanned by a fixed procedure, neutralized, and fatliquored with a quantity of the fat liquor under study equivalent to 3-g. total oil (about 2.6% oil on the drained, Cr-tanned weight). The pieces are dried first at 40° and then at 60°C. conditioned at 25°C. and 65% relative humidity, shaken with water, and the gain in weight measured after 0.5 and

3 hours. The same measurements are made on a leather processed in the same way but not fat-liquored. Water absorption number of the fat liquor is 100 times the ratio of the water uptake of the fat-liquored to the non-fat-liquored leathers. Variations in the amount of oil given (60-140% of the standard quality) had very little influence on the results. Water Absorption Numbers for 0.5 and 3 hours were in the same order for the different fat liquors. All but one of the cationic fat liquors gave Water Absorption Numbers higher than 100, and all but two of the anionic fat liquors (very highly sulfated) gave values below 100. Egg yolk gave a value identical with that of the non-fat-liquored leather (100). A similar determination can be made on squares tanned five days with spruce extract. For such leathers, the water Absorption Numbers of anionic fat liquors all were over 100, all cationic fat liquors below 100, and egg yolk gave the lowest value of all. Even within one type the fat liquors that gave the lowest values for Cr. leather gave the highest values for vegetable, and *vice versa*. Additions of HCOOH during fat-liquoring improved the oil takeup from anionic fat liquors, and lowered the Water Absorption Numbers slightly. Acidification had just the contrary effects with cationic fat liquors. Analyses of the leathers showed much less "bound" fat in Cr. leathers fat-liquored with cationic than with anionic fat liquors, and the reverse for vegetable leathers.

MODIFICATION OF SOME REACTIVE GROUPS OF COLLAGEN AND THE EFFECT ON THE FIXATION OF TERVALENT CHROMIUM SALTS. *R.L. Sykes. J.A.L.C.A.* **51**, 5, 235, (1956). Inactivation of collagen sidechains by processes of acetylation and methylation indicate that both may reduce the ability of collagen to combine with either anionic or cationic tervalent chromium ions. At least two types of reaction may take place, both of which result in a combination which is not reversed by exhaustive washing. One of these reactions is the actual penetration of carboxyl radicals into the chromium ion with the formation of a co-ordination complex. The second involves attachment at other reactive centres of the collagen molecule, probably by means of hydrogen bonds. Only co-ordinate bonds have the necessary directional character to bring about the enhancement of hydrothermal stability which follows interchain cross-linking, a characteristic of chrome tanning. The number and nature of the ligands occupying co-ordination sites in the chromium complex prior to its reaction with collagen will influence the amounts of chromium bound by either of the postulated mechanisms.

PATENTS

DEPOSITION OF POLYMERS INTO LEATHER. *U. S. Pat.* 2,721, 145. *Nicholas D. Cheronis, Brooklyn, N.Y.1. Via. J.A.L.C.A.* **51**, 2, 83, (1956). In a method of impregnating leather to deposit within the interfiber space therein sufficient elastomeric material to increase substantially the water resistance of said leather without, however, decreasing the water vapor permeability thereof to an objectionable degree, the steps which comprise adjusting the pH of the tanned leather to within the range of about 3 to about 5.5, preconditioning said leather by depositing therein several per cent, by weight, of at least one member selected from the

group consisting of sulfated and sulfonated animal and vegetable oils, washing said leather in water, draining off the wash water, rolling the leather while wet and maintaining it rolled for at least 24 hours, then tumbling said leather while warm with a warm emulsion containing, by weight, from about 2 per cent to 5 per cent of a polymerized elastomeric material, from about 90 per cent to 95 per cent of water, from about 3 per cent to 5 per cent of a volatile water-immiscible predominately non-polar organic solvent, from 0 per cent to 1.5 per cent of a plasticizer, and from about 0.4 per cent to 0.7 per cent of an emulsifier, said emulsion containing from about 2 per cent to about 5 per cent, by weight, of solids and having a pH between about 6.5 and 8.5, the leather being tumbled until the emulsion is substantially exhausted of depositable solids, and then drying said impregnated leather.

WATERPROOFING LEATHER. *Brit. Pat.* 706, 719. *Dow Corning, Ltd. Apl. July* 27, (1951). *Via. J.A.L.C.A.* **51**, 2, 83, (1956). Leather is rendered water-repellent by contacting it with a methyl siloxane copolymer [see Group IV (a)], preferably in solution in a volatile solvent, *e.g.* petroleum hydrocarbons, benzene, toluene and xylene, so that the leather contains from 0.1 to 60 per cent by weight of the leather of the copolymer. Other polymers, such as liquid dimethylsiloxanes, methylphenysiloxane resins, liquid methylphenylsiloxanes, stearylsilsesquioxane, butylmethylpolysilane, phenymethylpolysilane and stearylmethylpolysilane, may be added to the copolymers.

TANNING AGENTS. *Brit. Pat.* 709, 581. *O.C. Jekel. Apl. Dec.* 10, (1951). *Via. J.A.L.C.A.* **51**, 2, 84, (1956). Natural tannins are reacted with boric acid in the presence of an organic solvent to form compounds useful as tanning agents. Suitable solvents are methyl, ethyl, *n*- and and isopropyl, butyl, amyl, allyl and propargyl alcohols, formic, acetic, and propionic acids, esters of these alcohols and acids, acetaldehyde, acetone, methyl ethyl ketone, ethyl ether, and mixtures thereof. A preferred solvent is a mixture of ethyl alcohol, acetic acid, ethyl acetate, and water in equilibrium proportions. Reaction takes place at normal temperature or with warming, and the compounds formed may either be used in solution in the organic solvent or recovered by evaporation and recrystallisation from ethyl acetate. In examples boric acid is added to organic solvent extracts of oak bark and pomergranate tree bark. Higher organic acids, alcohols, and esters, *e.g.* lauric acid, myricyl alcohols, and beeswax, may be added to the solution ; other additives mentioned are softening, water-proofing, coloring, bactercidal, insecticidal and insect-repellent substances. Before use the solution may be acidified by adding up to 15 per cent of formic, acetic, or propionic acid.

LEATHER-TANNING MATERIALS. *Brit. Pat.* 716, 664. *Wurm. G., Trading as Wurm Leder fabrik G. (Firm of). Apl. May* 26, (1952). *Via. J.A.L.C.A.* **51**, 2, 86, (1956). Tanning materials are produced by adding to the waste liquors from the sulphite digestion of the wood of deciduous trees, especially beech, hot concentrated viscose spinning bath wastes containing alkali metal sulphites, separating calcium sulphate, reacting the solution with cation exchangers in the hydrogen form, concentrating and heating to 150°C. the solution now containing free ligneous

acids, particularly sulphonic acids, adding stabilizers, *e.g.* 2 per cent naphthalene sulphonic acids or their homologues, and finally atomizing the solution, when the solids content is 40-60 per cent by weight, *e.g.* by rotating a disc, in a drying tower to produce a voluminous powder. The hygroscopicity of the powder may be reduced by adding 0.2 per cent Turkey red oil. The tanning materials may be dissolved in water and dialyzed through a viscose membrane.

DELIMING HIDES AND SKINS. *Brit. Pat.* 714,165. *Benckiser, J.A. Apl. July* 23, 1951. *Via. J.A.L.C.A.* **51**, 2, 85, (1956). Hides or skins are delimed by treatment in a bath of or containing unrefined citric acid fermentation liquor produced by fermenting carbohydrates. The bath may also contain citric acid fermentation liquor from which calcium citrate has been precipitated or liquors from which tartaric acid or citric acid or salts thereof have been crystallized out ; lactic acid, acetic acid, tartaric acid, ammonium sulphate, pyrophosphates, polyphosphates, or metaphosphates may also be present. The fermentation liquor may be used as an additional deliming component in artificial leather heating. Examples describe the treatment of a goat skin and a calf skin.

TREATING ANIMAL PELTS. *Brit. Pat.* 714,829, *Wool Industries Research Association. Apl. Jan.* 14, (1953). *Via. J.A.L.C.A.* **51**, 2, 85, (1956). Animal pelts are treated with gaseous chlorine or bromine in vacuo, the material being cooled after drying prior to insertion in the vacuum chamber. The pelts may be conditioned to a moisture regain between 4 and 8 per cent and cooled to a temperature between 35° and 45°F. before the gaseous treatment, and afterwards neutralized with sodium sulphite. Specifications 417,719, 475,742 and 493,098 (all in Group IV) are referred to.

DEPILATORY PAINTS. *Brit. Pat.* 735, 783. *Zalcman H. Appl. Feb.* 17, (1953). *Via. J.A.L.C.A.* **51**, 4, 201, (1956). A depilatory paint of the type used for dewooling sheepskins and the dehairing of other skins for application to the flesh side of skins comprises an aqueous composition free from monovalent cations made up from a source of hydroxyl ions selected from the oxides and hydroxides of calcium, strontium and barium, a source of hydrosulphide ions selected from the sulphides and hydrosulphides of calcium, magnesium, strontium, aluminium and barium, and a reserve source of hydroxyl ions, the hydrosulphide ion content being within the range equivalent to 2.0 to 23.5 per cent calcium hydrosulphide by weight of the composition, and the hydroxyl ion concentration being such that the pH is more than 12.07 and not more than 12.3. A water-soluble calcium salt may be added if necessary to depress the hydroxyl ion concentration. The composition may contain an inert filler such as kaolin, kieselguhr, talc or cereal flour. The hydroxyl ion concentration can be reduced by the addition of calcium chloride for example, or a soluble salt of a polyvalent metal which will react with lime to form a soluble calcium salt and precipitate the polyvalent metal hydroxide. Aqueous compositions exemplified contain (i) calcium hydrosulphide and lime with barium or strontium hydroxides ; (ii) calcium hydrosulphide and lime with barium or strontium sulphide ; (iii) calcium hydrosulphide, barium or strontium hydroxide and a water-soluble calcium salt ; (iv)

barium or strontium sulphide and lime with a water-soluble calcium salt ; (v) barium or strontium hydrosulphide and lime with a water-soluble calcium salt ; (vi) barium or strontium hydrosulphide and barium or strontium hydroxide with a water soluble calcium salt. Compositions (i) and (ii) are preferred. The paint compositions are suitable for depilating sheepskins at 70° to 80°F. in 24 hours, or longer in the case of hides. The hides or skins are preferably soaked and fleshed before depilation. Specifications 680,784 and 706,746 are referred to.

WATERPROOFING LEATHER. *Brit. Pat.* 736,584. *Armour & Co. Appl. Feb.* 9, (1951). *Via. J.A.L.C.A.* **51**, 4, 202, (1956). Leather is permanently waterproofed by reaction with an oxidizing agent capable of hydroxylating the free amino groups of the protein and then with a fatty acid halide having from 1 to 22 carbon atoms in its hydrocarbon radical. Suitable oxidizing agents mentioned are hydrogen peroxide, peracetic acid and permonosulphuric acid and fatty acid halides mentioned include lauryl, palmityl, oleyl, tallow acid and tearyl chlorides.

WATERPROOFING LEATHER. *Brit. Pat.* 736,378. *Midland Silicones Ltd.* (*Formerly Dow Corning, Ltd.*) *Appl. June* 18, (1953). *Via. J.A.L.C.A.* **51**, 4, 202, (1956). Leather is waterproofed by impregnation with a composition comprising (1) 15 to 50 per cent (by weight) of $Ti(OR)_4$ or an aliphatic hydrocarbon-soluble partial hydrolysate thereof in which R is an aliphatic hydrocarbon radical having less than 13 carbon atoms or a hydroxylated aliphatic hydrocarbon radical having less than 13 carbon atoms and containing less than 4 hydroxy radicals ; (2) 5 to 70 per cent of a copolymer composed of trimethylsiloxane and SiO_2 units, the units being in such proportion that the CH_3:Si ratio is from 1.0:1 to 2.5:1, and (3) 15 to 80 per cent of a polysiloxane of the formula $R^1_n SiO_{\frac{4-n}{2}}$ where R^1 is an alkyl or alkenyl radical having less than 4 carbon atoms, or a monocyclic aryl radical, and N has an average value of 2 to 2.9 [see Group IV (a)]. The compositions may be used in the form of solvent-less pastes which may contain polishing agents, or in solution in non-aromatic solvents such as Stoddard solvent or naphtha mineral spirits. The compositions may be applied by brushing or dipping leather sheet or articles such as shoes or belts. Any leather, tanned, tawed or otherwise cured, finished or unfinished, or leather from horse side, pig-skin and other animals, may be treated. The leather used in the examples is " Tomahawk Kip," a commercial emulsion top vegetable tanned cowhide.

IMPREGNATING PAPER AND LEATHER. *Brit. .Pat.* 717,144. *Soc. pour le Traitement et l'Amelioration des Tissues. Apl. Feb.* 6, (1952). (*Feb.* 7, 1951), *No.* 3162/52. *Class* 76 *and* 96. [*Also in Group IV* (c)]. *Via. J.A.L.C.A.* **51**, 5, 264, (1956). The resistance to abrasion of fibrous materials, *e.g.* paper, cardboard or leather, is improved by impregnating them with a silicic acid ester containing only ester groups attached directly to the silicon atom, hydrolysis of the ester being substantially prevented before impregnation, and then heating to deposit silica in the fibers. Specified esters are methyl, ethyl, propyl, and octyl silicates. The ester may be applied alone or as a solution in, for example, benzine, toluene, trichlorethylene, or an alcohol, or as an aqueous emulsion.

UNHAIRING HIDES. *Brit. Pat.* 717,642. *Berka, E. Apl. Sept.* 16, (1952). (*Sept.* 25, 1951), *No.* 23276/52. *Class* 76. *Via. J.A.L.C.A.* **51**, 5, 264, (1956). An unhairing agent for hides and skins is prepared by allowing fish or fish waste to undergo autolysis at 15-40°C., the liquid subsequently obtained being separated from bones, scales, etc. and stabilized by the addition of alkaline substances, particularly calcium hydroxide. Alternatively the liquid is stabilized by mixing it with a predried absorbent such as sawdust or bentonite to give a dry-feeling product. The latter may either be mixed with dry alkaline agents before storing or may be mixed with an alkaline agent in aqueous solution shortly before use. To accelerate the unhairing process the hides or skins are preferably pre-treated with dilute sodium hydroxide solution.

NOTES AND NEWS

INDIAN STANDARDS INSTITUTION

Review of Ninth Annual Report

The year 1955-56 has witnessed further progress and expansion in the standardization activity in India. This is revealed by the 119-page Annual Report of the Indian Standards Institution (ISI) just issued.

During the year one more Division Council, the Agricultural and Food Products Division Council, was inaugurated raising the number of Division Councils working under the Institution to five. The scope of work of the new Division Council, which was drawn up in consultation with the Ministry of Food and Agriculture, includes a large number of items relating to agricultural and food products, their grading, storage and marketing, their preparation and processing, and the machinery and equipment used for it, in addition to Edible Starches, Confectionery, Cereal Products, Glucose, Vegetable Oils and Pest Control Chemicals. Decision was also taken to create two more Division Councils, namely Structural and Metals Division Council and Electrotechnical Division Council.

The Report records that the Institution issued 144 Indian Standards (including 2 revisions), during 1955-56 as against 123 in the previous year. This brought the total number of Indian Standards published and in press up to 31st March 1956 to 760. Important subjects covered by the standards printed during the year were Dry Battery and AC Mains Operated Radio Receivers ; Community Radio Receivers ; AC Whole Current Electricity Meters ; PVC-Insulated Cables ; Asbestos Cement Sheets ; Stoneware Pipes and Fittings ; Sheet Linoleum ; Colour Fastness of Textile Fabrics ; National Flag of India, Silk Khadi and Wool Khadi ; etc.

The demand from the industry for formulating Indian Standards in new fields continued to increase and 234 new proposals were received during the year against 97 during the previous year. The increasing

interest which Indian Industry has shown in the work of the ISI was also evidenced by an increase in the number of its subscribing members, the total membership on 31 March 1956 being 1181 compared with the previous year's figure of 1032. The financial contribution by industry increased to Rs. 3,01,876 as compared to Rs. 2,68,638 in the previous year.

During the year the ISI opened its first Branch Office at Bombay. The Branch Office disseminates information to the industry regarding the work of the Institution, helps and advises those engaged in industry and commerce who wish to implement or adopt standards, conducts technical enquiries and preliminary inspection in connection with the ISI Certification Marks Scheme, and holds stock of Indian, British, ASTM and IEC Standards for reference purposes and for sale to the public.

Encouraged by the results and reactions of the first Standards Convention held in Calcutta in 1954 the ISI organized another convention during the year at Bombay. The convention, inaugurated on 10 January 1956 by Shri T. T. Krishnamachari, Minister for Commerce and Industry and Iron and Steel, and President ISI, proved a great success.

The ISI set up a stall in the Indian Industries Fair opened by Shri Jawaharlal Nehru on 29 October 1955 where it displayed materials, components, equipment, accessories, chemicals and finished products for which Indian Standards has been prescribed. Illustrated charts, descriptive posters, models and sketches of various types put up at the stall spotlighted the need for standardization and the progress made by the ISI with the broad-based co-operation of diverse interests. The stall was awarded a " Highly Commended " Certificate for ' Art-in-Industry '.

The ISI received seventy applications for the grant of licences for the use of Standard Certification Marks for engineering, chemical, textile, metallurgical and building materials conforming to Indian Standards, from top-ranking firms of the country. Eight licences were granted after standard marks in respect of the products covered by them had been specified.

Out of 734 Indian Standards published, 564 had been adopted by the Central Government till 31 March 1956. Besides, various State Governments and local bodies had expressed their keen desire to follow Indian Standard Specifications.

The detailed plans for the ISI building were finalized during the year under report. The building will have a basement and five storeys, the total floor area being 5,853 sq. metres. The building project has been estimated to cost Rs. 18.5 lakhs including the cost of two lifts, electrical and sanitary installations, and air-conditioning.

The ISI has, from time to time, been conducting surveys of the testing facilities available in the country and has promoted augmentation of such facilities, wherever necessary, with the assistance and co-operation of the authorities concerned. Towards the end of the year according to the Report 125 problems were being investigated. These problems covered a wide range in the fields of engineering, building, textiles, chemicals and food products.

To meet the demand of the industry for more standards a comprehensive second five-year plan for expanding the activities of the ISI was developed by the ISI Directorate. The Planning Commission approved it and included it in the National Second Five-Year Plan. The plan envisages an increase in output of standards from about 140 per year to 200 standards per year, against the actual estimated demand of about 300 standards per year. It also envisages that 300 licences will be issued during the plan period.

The ISI continued to maintain, during the year under report, cordial and co-operative relations with the various national standards bodies of the Commonwealth and other standardization organizations all over the world, thus giving the members a comprehensive background for their work. Detailed reports by various delegations sent out by the Indian Standards Institution are included in the Report.

The Report includes a number of appendices listing the members of the ISI's General Council, its Executive Committee, Building Fund Committee and various Division Councils, as also Sustaining Members, Technical Committees, Standards under different stages of preparation, etc.

POCKET pH METER.

Pocket-size pH meter for acidity and alkalinity measurements is battery-operated and has wide variety of applications for chemical and industrial research and testing laboratories. Range of meter is from 2 to 12 pH ; combines both reference and glass electrodes ; has " memory " dial for use in standardizing ; and operates from batteries like those used in flashlights and hearing aids.

Source : Scientific Instrument Division, Beckman Instruments Inc., Fullerton, Calif.

— *Lea. & Shoes* **132**, 17, 21, (1956).

ROME MEETING OF LEATHER CHEMISTS. The next biennial meeting of the International Union of Leather Chemists Societies will be held in Rome, Italy, from September 15-19, 1957, under the auspices of the Italian Leather Chemists Association, which will be host for the conference. Members of the member-societies of the International Union are invited to submit papers which will be selected by the executive committee, and manuscripts, accompanied by a short summary, should be forwarded to A. Harvey, Hon. Sec., International Union of Leather Chemists Societies, " Craigieburn ", Duppas Hill Road, Waddon, Croydon, Surrey, England.

— *Chem. & Ind. No.* 54, 906, *Sept.* 1956.

MARKETS FOR HIDES AND SKINS IN ITALY. The Italian Hides and Skins market is at the moment somewhat dull. This partly of a seasonal character, viz., in early summer. But it is also due to the growing use of substitutes for hides. Italy's total imports and imports from India of skins were as follows in the first five months of 1955 and 1956.

	1955 Jany.-May tons	1956 Jany.-May tons
Crude skins, not good for furriery (Mainly goat and sheep skins)		
Total imports		
Imports from India ..	107.7	566.7
Tanned skins without hair.		
Total imports ..	918.6	910.6
Imports from India ..	4.5	10.0

—*Report received from the Joint Chief Controller of Imports and Exports.*

TANNING MATERIALS OF THE BRITISH COMMONWEALTH. MANGROVE BARK. *R. W. Pearman. Colonial Plant and Animal Products,* 5, 96, (1955). *Via J.A.L.C.A.* **51**, 5, 263, (1956). The species of mangrove found in various countries of the commonwealth are described, with statistics on exports of bark and extract, and imports into the U.K.

Human skin can be tanned like others. They have more body than cow-skins, and unlike them, are thickest upon the abdomen. Those who have experimented upon this most disagreeable subject, assert that they require a great number of limings and of exposures to the infusions of bark, and that they swell up a great deal under these operations.

— *J. de Fontenelle and F. Malepeyre, The Arts of Tanning, Currying and Leather-Dressing (Edited from the French by Cambell Morfit), Philadelphia,* 1852.

C. L. R. I. NEWS

The Council of Scientific & Industrial Research has nominated Dr. Y. Nayudamma, Assistant Director-in-charge, as its representative on the Leather Sectional Committee (C D C : 16) of the Indian Standards Institution and its sub-committees. The Indian Standards Institution has approved Dr. Y. Nayudamma as the Acting Chairman of C D C : 16.

The Council has also nominated the under-mentioned officers as the alternate nominees on the Sub-Committees of the Indian Standards Institution mentioned against each.

Mr. M. A. Ghani, Senior Scientific Officer. C D C 16 : 1

Dr. S. K. Barat, Senior Scientific Officer. C D C 16 : 5 and C D C 16 : 6.

The Council of Scientific and Industrial Research with the concurrence of the Indian Council of Agricultural Research have accorded their approval for the continuation of Mr. B. N. Pal, Senior Scientific Officer (I. C. A. R. Scheme) as a member and convenor of the Heavy Leather Sub-Committee (C D C : 2) of the Indian Standards Institution.

Dr. Y. Nayudamma, Asst. Director-in-charge, visited a number of Chinese and other tanneries, manufacturers of leather auxiliaries, raw Hides and Skin merchants and the Bengal Tanning Institute at Calcutta.

Dr. Y. Nayudamma, Assistant Director-in-charge, attended the 44th Session of the Indian Science Congress held at Calcutta from the 14th to 20th January 1957.

The following officers of the Institute also attended the Session :

Mr. S. K. Mitra.

Dr. D. Ramaswamy.

Dr. S. N. Sen.

Dr. Y. Nayudamma, Asst. Director-in-charge, attended the Conference of Directors of National Laboratories held in New Delhi from December 13 to 15, 1956.

1. We welcome the following members of the staff who have joined this Institute :

Shri C. B. Nair, Accounts Officer.

Shri G. N. Hore, Junior Scientific Assistant.

Shri G. S. Rama Iyer, Senior Scientific Assistant transferred from The Central Electro-Chemical Research Institute, Karaikudi.

2. The Council of Scientific & Industrial Research has nominated Dr. Y. Nayudamma, Assistant Director-in-charge, to serve on the Export Promotion Council for leather and leather goods set up under the auspices of the Chief Controller of Imports and Exports, Ministry of Commerce and Industry, Government of India, New Delhi.

3. Dr. Y. Nayudamma, Assistant Director-in-charge, has been nominated as a representative of the Council of Scientific & Industrial Research on the Hides and Skins Committee of the Indian Council of Agricultural Research.

4. The Council of Scientific & Industrial Research has approved the extension of services of Mr. B. N. Pal, S.S.O. (I.C.A.R. Scheme) after super-annuation in the same scheme.

5. Shri G. Lakshminarayana, Junior Scientific Officer, and Shri K. S. Rao, Junior Scientific Assistant, returned after participating in the 'Science in the service of industry' exhibition organised under the auspices of the UNESCO Conference.

VISITORS

	Name	*Date of visit*
1.	Staff and Students of Rangoon University ..	31-12-1956.
2.	Shri M. N. Kaul, Secretary, Lok Sabha, New Delhi ..	5- 1-1957.
3.	Shri S. L. Shakdher, Joint Secretary, Lok Sabha, New Delhi ..	5- 1-1957.
4.	Shri A. R. Mukherjee, Secretary, Legislative Assembly, Calcutta ..	5- 1-1957.
5.	Shri S. Hanumanthappa, Secretary, Legislative Assembly, Madras ..	5- 1-1957.
6.	Members of the Public Accounts Committee. ..	9- 1-1957.
7.	Mr. Norman Sealbow, BBC Television Service, London ..	10- 1-1957.
8.	Mr. Pedro E. Robler, Philipines nominee for technical training under Colombo Plan ..	24- 1-1957.
9.	Prof. Chao Chien-Chang & Prof. Shiao Thur Pan, Academa Sinica, Peking. ..	29- 1-1957.
10.	Prof. L. Marton, Chief, Electron-Physics Division, National Bureau of Standards, Washington. (U.S.A.). ..	30- 1-1957.