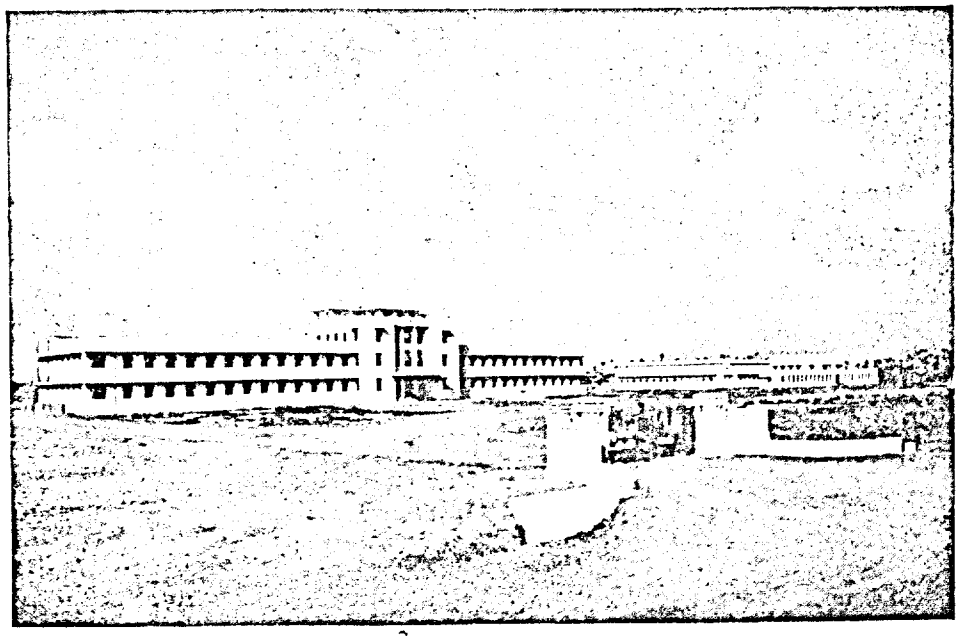
Bulletin of The Central Leather Research Institute Madras

VOL. III DECEMBER, 1956 No. 5



COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

INDIA

Bulletin of The Central Leather Research Institute

Vol. III DECEMBER, 1956 No. 5

CONTENTS

Annual Subscription.—Rs. 9/- (inland); Rs. 18/- (foreign); Single Copy As. 12.

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

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

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

SYMPOSIUM ON "RAW HIDES AND SKINS - CURING AND PRESERVATION"

The Central Leather Research Institute has been established at a great cost to serve the Indian leather industry and to promote its growth. One of the functions of this Institute is to disseminate the scientific knowledge in the trade and to put the Indian leather industry in the lap of science. This is sought to be achieved by this Institute by having close liaison and contact with the industry and to be alive to its immediate needs and problems. Personal contacts and discussions between the scientists, the leather technologists and the tanners actively engaged in this industry will go a long way in this direction. It is with this view, holding a symposium at this Institute has been made an annual feature. The first symposium on "East India Tanning Industry and Tanning Agents" was held at this Institute in July 1955 which was largely attended and appreciated by the representatives of the various sections of the industry. It is now proposed to hold another symposium at this Institute sometime by about the end of February 1957. The topic for discussion at this symposium is "Raw Hides and Skins — Curing and Preservation".

The trade and technological processes of raw hides and skins in India deserve immediate consideration by all those engaged in the leather industry. India has the unique advantage of being the largest single holder of livestock and producing about 16 million pieces of cow hides, 5 million pieces of buffalo hides and 22 million pieces of goat skins and 14 million pieces of sheep skins. In addition to these materials, a large amount of reptile skins are produced. Hitherto, India used to export raw hides and skins but to-day, the Indian Union does not export a single piece of hide. On the other hand, it imports about 150 tons of raw hides every month from countries like Italy, Africa, Arabia, Australia etc. The heavy hides for use in the manufacture of industrial leathers such as picking bands etc., are no longer available in the Indian Union. As such certain amount of hides are necessarily to be imported. With the introduction of the ban on cow slaughter in the majority of the States in India to-day,

the quality of the hides available have been much deteriorated and this situation has made it difficult for the development of finished upper leather industry. The tanner well-recognises that good leather cannot be made from bad hide. In the field of skin trade, the prices of raw skins are soaring high. A large proportion of goat skins produced are still exported to the U.K., and U.S.A., in dry cured condition. Attempts are being made to establish a glace kid industry in India utilising these goat skins. The Central Leather Research Institute has obtained the services of an American expert to promote the establishment of glace kid industry. Complaints have been received from countries abroad in regard to the deteriorating quality of these exported skins because of improper curing and preservation. Difficulties are also experienced and great losses are obtained by the Indian tanners due to the lack of proper techniques, proper facilities for handling materials, lack of railway waggons etc. Losses continue due to bad flaying and bad curing and preservation methods and also due to the damages caused by insects, diseases and poor care given to live animals. Research workers in the Agricultural and Veterinary fields have been conducting researches incessantly for the improvement and betterment of the livestock, their care, methods of breeding etc. Newer tools and techniques for flaying and preservation of hides and skins have also been attempted to be introduced. Schemes are afoot for the improvement of the raw hides and skins by various State Governments and also by the All India Khadi and Village Industries Board, Small Scale Industries Service Institute and by the F.A.O. Expert. Researches are conducted at this Institute on the histological, entomological, bacteriological, biochemical and biological aspects of raw hides and skins and also for developing better curing agents and curing methods.

From this account, it is clear that the scope for discussion in this field—raw hides and skins—their curing and preservation—is very wide and the problems relating to it are very important and demand immediate consideration by all those interested in the tanning field. It is with this object in mind, this symposium is to be organised. The Council of Scientific & Industrial Research has kindly approved to hold such a symposium. It is hoped that the mutual exchange of ideas between the various groups involved in this field on the various aspects of this subject will prove helpful in the solution of the problems pertaining to them and facilitate the improvement of the quality and availability of raw hides and skins fetching better prices for the raw stock as well as the finished leathers.

The subjects to be presented at the symposium are classified in Appendix A. You are requested to contribute a number of papers on this subject. The papers may be presented either in English or in any other language. An advance copy together with an abstract of the paper to be presented at the symposium may kindly be forwarded before 30th January 1957 to enable us to finalise the programme and to circulate the abstracts of the papers. Arrangements will also be made for the papers to be read in the absence of the authors.

315

Those who are interested in participating in the symposium are requested to fill in the enclosed form Appendix B and return the same at an early date.

In connection with the symposium an exhibition of leathers and leather goods will be organised at this Institute. You are requested to make this exhibition a success by sending exhibits of leathers and leather goods from your concern.

Along with the exhibition, the Central Leather Research Institute will have an open house for a period of one week. The delegates attending the symposium are cordially invited to go round the Institute and see the work being done. You can see the raw materials, processing methods, experimental and testing techniques, charts and models and the finished products. The research workers will show you the work being done and explain to you how and why it is important to the leather industry and the country. Arrangements will also be made for the delegates to visit some of the tanneries in and around Madras City.

Your active co-operation is solicited to make the symposium a grand success. Your active participation will enrich the discussion of the symposium and establish personal contacts with this Institute which is essential for the growth of this very vital industry to which you and I belong.

An early reply will facilitate drawing up of a detailed programme which is to follow.

EDITOR.

APPENDIX A.

Raw Hides and Skins—Curing and Preservation

Scope.

1. Statistical data relative to livestock population ; production of raw hides and skins in India ; percentage of raw hides and skins produced in India on its livestock population, in comparison with the percentages in other countries.
2. Effects of age, sex, rearing, environment, breed, etc. on the quality of raw skins and hides.
3. Bacterial and parasitic diseases of animals and cattle mortality.
4. Methods of flaying and suggested improvements.
5. Bye-products from the slaughter houses and the dead animals like hooves, horns, etc. and their utilisation.
6. Collection of raw hides and skins and suggestions for improved methods.
7. Storage of raw hides and skins—refrigerated stores.
8. Classification and grading of raw materials.
9. Defects in raw hides and skins and suggestions for improvements.
10. Problems of transport and distribution and marketing.
11. Leather-making properties of hides and skins as far as known.
12. Histology of hides and skins.
13. The chemistry of skin proteins and reactions of proteins with acids, bases, salts, etc.
14. Post-mortem changes occurring in raw hides and skins.
15. Methods of preservation of raw hides and skins.
16. Curing agents with particular reference to India.
17. The effects of humidity, moisture, heat, salt, impurities in salt, addition to the salt, different curing agents, etc.
18. Red heat, salt stains, causes and prevention.
19. Entomological problems of hide preservation.
20. Preservation by pickling—materials, methods and principles involved.

APPENDIX B.

Central Leather Research Institute, Madras-20.

Particulars to be supplied by those wishing to participate in the Symposium.

1. Name
2. Full Address
3. (*a*) Title of paper

   (*b*) Whether the paper deals with fundamental or applied aspects, or is a review.
4. Do you intend to take part in the general discussions on the subjects.
5. If so, please indicate title and send a short abstract.
6. Is accommodation in Madras to be reserved for you ?
7. Are you interested in visiting tanneries in and around Madras ?
8. Any other request or suggestion not covered above.

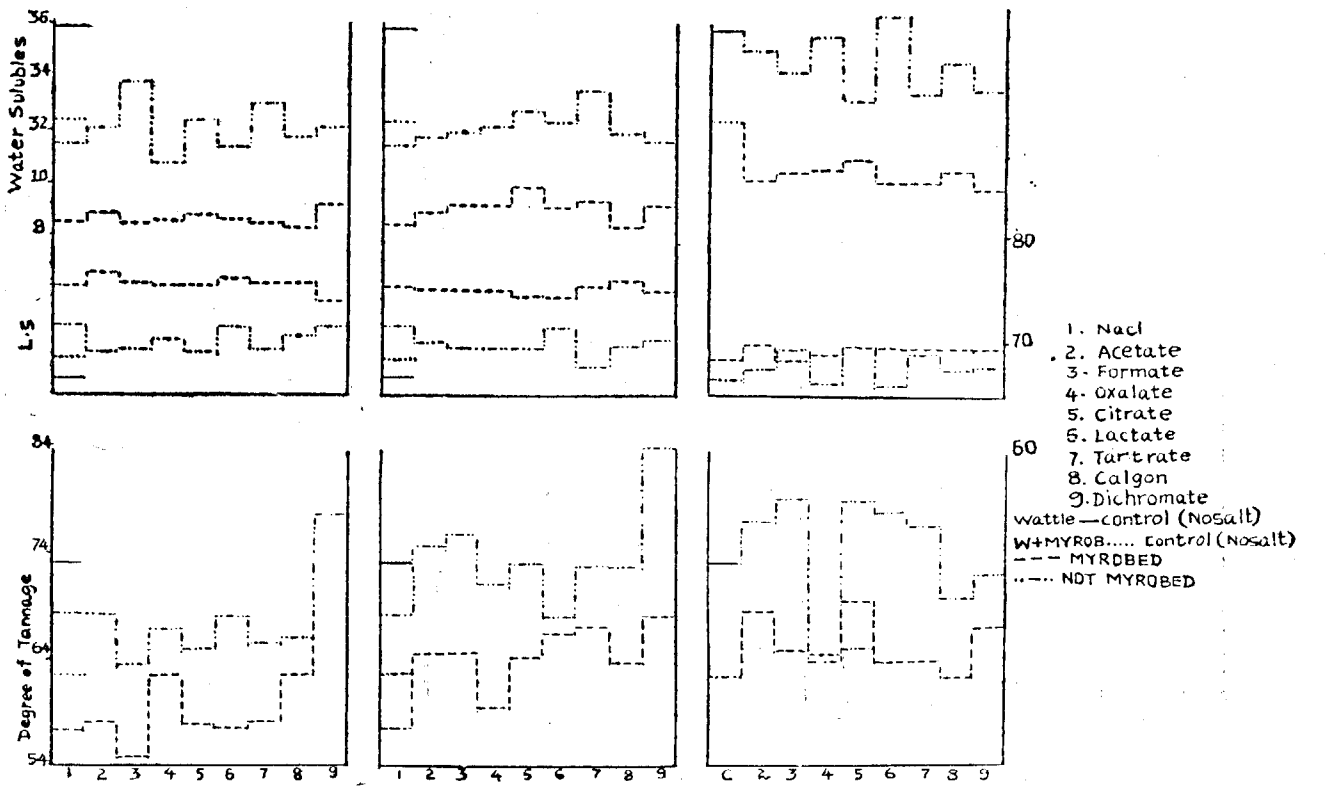

Water Subbles
L.S
Degree of Tannage
1. Nacl
2. Acetate
3. Formate
4. Oxalate
5. Citrate
6. Lactate
7. Tartrate
8. Calgon
9. Dichromate
Wattle—control (Nosalt)
W+MYROB..... Control (Nosalt)
--- MYROBED
···· NOT MYROBED

FIG. 1

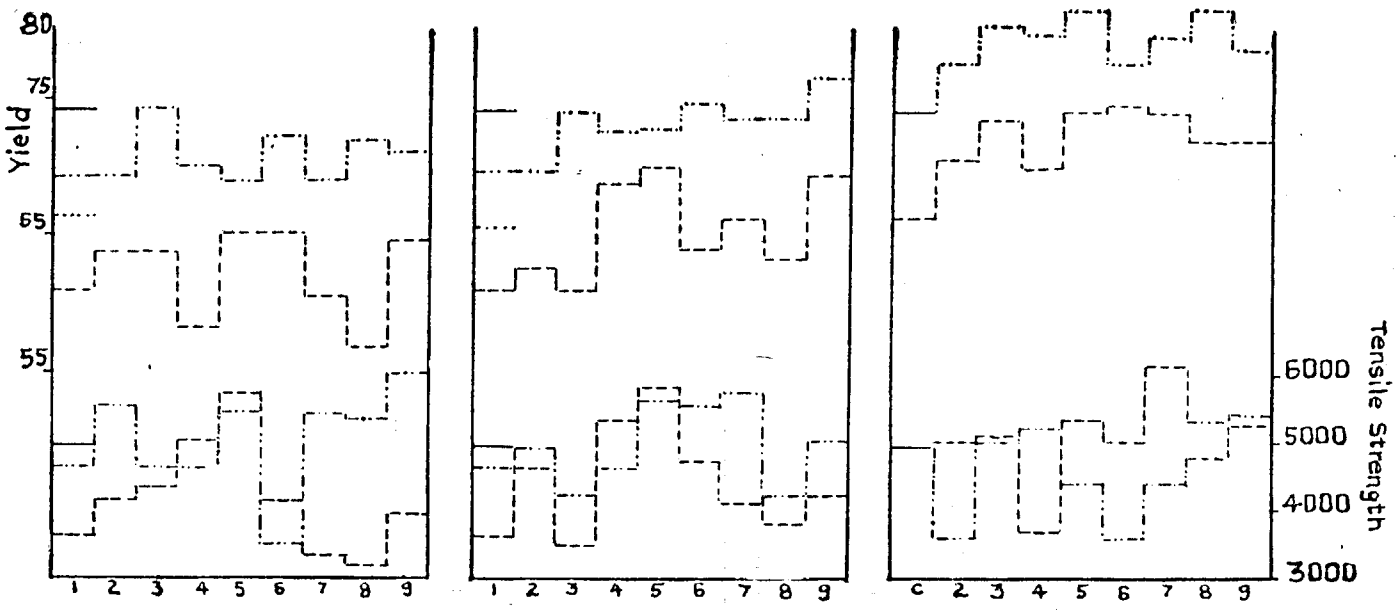

Yield
Tensile Strength

FIG 2

probably due to the reversal of loosely bound tannin when the leather tanned with 90°Bk liquor is retanned with 30°Bk. myrob. liquor.

NaCl — H_2SO_4 system :

As compared to control, the yield is decreased (69%) and on myrobing, it is further decreased to 61%. The pretreatment with sod. chloride thus tends to lower the yield.

NaCl – NaX – H_2SO_4 system : Series I :

All the salts tend to decrease the yield. This effect may be due to NaCl present in the system or the cumulative effect of both the NaCl and NaX. Considering the percentage yields, the order for the salts is as follows :

Control (74%) , Formate > lactate > Calgon > dichromate > Oxalate > acetate chloride > Citrate Tartrate (69%)

On further myrobing, the yields are further reduced. From the yield values, the order for the salts is :

Control (66%) > citrate lactate > dichromate > formate NaCl > Tartrate > Oxalate acetate > Calgon (57%)

Though in each case, the percentage yield is reduced on myrobing, the effect is not to the same extent. Evidently the loosely combined tannin (removed during myrobing) is different with the different salts used for pretreatment.

NaX – HX system : Series II :

As compared to control, the percentage yields in the system is low or high depending upon the salt. The order for the salts is as follows :

Dichromate 76·5% > lactate > formate control (74%) > Tartrate Calgon > Oxalate Citrate > Acetate Chloride (69·5%)

Dichromate, lactate and formate systems are thus helpful to increase the yield as compared to the control whereas the other salts reduce the yield when used as a buffer system.

On further myrobing, the yield values are further reduced. The order for the salts is :

Citrate (70%) > dichromate > oxalate > Tartrate > control (65·5%) > lactate > Calgon > acetate > formate chloride 56%

Here again, the myrobing no doubt reduces the yield value but the extent of decrease in yield is different with different salts used for pretreatment.

NaX added to Tanliquors : Series III :

As compared to control, *the yield is increased* in each case where salts are added to tanliquors contrary to the results obtained when they are used for pretreatment of the pelt. From the yield values, the salts may be arranged in the order :

Calgon Citrate 81·5% > Formate > Oxalate tartrate > Dichromate > acetate lactate > Control 74%

On further myrobing, the order is as follows :

Lactate 74·5% > Citrate tartrate > formate > Calgon dichromate > Acetate > Oxalate > Control 66·5%

Here again, myrobing reduces the yield in each case but the extent to which it reduces varies with the salt used.

TENSILE STRENGTH :

Control : The tensile strength of the control sample is ~ 4900 lbs/sq in.

NaCl — H_2SO_4 system : As compared to the control, the tensile strength is slightly reduced ~ 4600 lbs/sq. in. for wattle tannage. But on further myrobing, the tensile strength is considerably reduced to ~ 3600 lbs/sq in.

NaCl — H_2SO_4 — NaX system : Series I :

The order of tensile strength values for the salts is :

Dichromate (6000 lbs./sq. in.) > Acetate > Citrate Tartrate Calgon > Control (~4900 lbs./in.²) > Oxalate formate chloride > Lactate (~3500 lbs./in.²)

Thus dichromate increases the tensile strength and lactate decreases the same.

On further myrobing, the order is as follows :

Citrate (~5700 lbs./in.²) > Oxalate > formate > acetate lactate > dichromate > chloride > Tartrate Calgon (~3200 lbs./in.²)

In case of citrate, oxalate and lactate, the tensile strength is increased on myrobing and in other cases, the tensile strength is decreased. This decrease is very drastic in case of dichromate and calgon and it may be recalled the yield values were also comparatively higher for myrobed leathers where citrate and lactate were used in this series.

NaX — HX system : Series II :

The order for tensile strength values in this series is :

Tartrate (~5700 lbs./in.²) > Citrate > lactate > dichromate > control (~4900 lbs./in.²) > Acetate > Oxalate > chloride > formate > calgon (~4200 lbs /in.²)

On further myrobing the order is :

Citrate (~5800 lbs./in.²) > Oxalate > lactate > acetate > tartrate > calgon > chloride > formate (~3500 lbs./in.²)

As in Series I, the myrobed leathers have a higher tensile strength in case of citrate and oxalate but in other cases, the values are lower. The yield values were also higher for citrate and oxalate sets for myrob. tanned leathers in this Series II.

NaX added to tanliquors : Series III :

For wattle tanned leathers, the order for tensile strength values is :

Dichromate (~5400 lbs./in.²) > Calgon > oxalate > formate > control > citrate > tartrate > Formate > Lactate (~3600 lbs./in.³)

On further myrobing, the order is :

Tartrate (~6100 lbs. in./²) > Citrate > dichromate > lactate > formate > acetate > Calgon > Oxalate

It may be recalled that yield values were also highest with tartrate, citrate, lactate and lowest for oxalate.

CHEMICAL PROPERTIES :

DEGREE OF TANNAGE :

Control (no salts) : The degree of tannage for wattle tanned leather was 73% ; but on myrobing, the degree of tannage is reduced to 62.5. The yield is also reduced on myrobing.

NaCl — H_2SO_4 system : The degree of tannage is reduced (as in case of yield) to 68 as compared to control 73. On myrobing it is further reduced to 57.0.

NaCl — H_2SO_4 — NaX system : Series I :

The order for the degree of tannage values is :

Dichromate 77·5 > control 73 > Acetate lactate chloride > Oxalate > Calgon tartrate > Citrate > formate (63·5%)

Only in case of dichromate set, the degree of tannage increased and in other cases, it decreased.

On further myrobing, the order is :

Dichromate 62 > Control (62·5%) Oxalate Calgon > Citrate lactate Tartrate > Acetate chloride > Formate 54·5

Myrobing reduces the degree of tannage in all cases ; the extent of decrease however is dependent upon the salt used for pretreatment of pelt. As compared to control (myrobed), the degree of tannage values are lower except in case of dichromate.

NaX — H_2SO_4 system : Series II :

The order for the degree of tannage values is :

Dichromate 84% > formate citrate 73% > acetate tartrate > Control > Calgon > Oxalate > chloride lactate 68%

The yield values were also in the same order except in case of lactate.

On further myrobing, the order is :

Dichromate > Tartrate lactate > Acetate formate > Citrate Calgon > Control > Oxalate > Chloride

Thus myrobing reduces the degree of tannage value but as compared to control, the degree of tannage values are higher in case of all salts except chloride and oxalate.

NaX added to Tanliquors : Series III :

The order for degree of tannage values (wattle tanned) is :

Formate > lactate > acetate > tartrate > control > dichromate > Calgon citrate 79% > Oxalate (64%)

On further myrobbing, the order is :

Citrate > acetate > dichromate > formate oxalate > lactate tartrate > Calgon control

Myrobing reduced the degree of tannage values in all cases; but as compared to the control (myrobed), the degree of tannage values are higher in case of each salt.

LEATHER SUBSTANCE : (L.S.=Hide substance+fixed tans)

Control : The leather substance for wattle tanned leather is 66.5%. On further myrobing, it is increased to 68.5%.

NaCl — H_2SO_4 system : The leather substance value is increased to 71.5. Evidently, NaCl helps to increase the leather substance value.

NaCl — H_2SO_4 — NaX system : Series I :

The order for leather substance values is (wattle tanned)

Sod. chloride (71·5) lactate dichromate > Calgon Oxalate > Formate acetate citrate tartrate 69 0 > Control

All the salts used increase the leather substance value. This value is increased more so with salts of strong and mineral acids (only exception being lactic acid). It is to be noted, however, the range of leather substance value is only 71.5 — 69.0 which could be taken as equal in all cases. On further myrobing, the values for leather substance increase in all cases. Leather substance values are also approximately the same in all cases varying from 75-76 (Dichromate 74). The lowest value is recorded for control 68.5

NaX — HX system : Series II :

The leather substance values are approximately the same in case of all salts ranging from 71.5-68.0%. The order is :

Sod. chloride lactate (71·5) > dichromate acetate > citrate formate oxalate calgon > Tartrate > Control 66·5

The salts increase leather substance value as compared to control. On further myrobing, the values are further increased and the value is approximately the same with each salt 75%. The myrob control sample has a leather substance value of only 68.5.

NaX added to tanliquors : Series III :

The leather substance values vary and the order is :

Citrate 70·0 > formate > tartrate > acetate calgon dichromate > Control > Oxalate lactate 66·5

Oxalate and lactate slightly reduce the leather substance value but all other salts increase the same. On further myrobing, the leather substance values increase in all cases and the value is approximately 69.5. As compared to control (68.5) — the leather substance values have not increased to any great extent, but the trend of increase on myrobing is there.

WATER SOLUBLES CONTENT :

Control : The water solubles content for wattle tanned leather is fairly high at 15.8%. On myrobing, the value is reduced to 12.4% indicating the removal of loosely bound tannin from the leather or due to the fixation of loosely bound tannins. But if the loosely bound tannin is firmly fixed on myrobing the degree of tannage should be increased which is found to be not the case : Lower degree of tannage in spite of higher fixation of tannin may be due to higher H.S. value recorded for myrob tanned leathers.

NaCl — H_2SO_4 system : The water solubles value is greatly reduced in this system (11.5) and this is further reduced on myrobing (8.5%)

NaCl — H_2SO_4 NaX system : Series I :

The order for water solubles values is :

Oxalate 10·8% < lactate < chloride < calgon < dichromate < citrate < tartrate acetate < formate (13·3%) < control (15·8%)

As compared to control, all the salt pretreatments tend to reduce the water solubles content.

On further myrobing, the water solubles values are further reduced to approximately 8.5% in all cases (dichromate 9.2% and control 12.4%)

NaX — HX system : Series II :

As compared to control, the water solubles values are reduced from 15.8% to 11.5 — 13.5%. The order for water solubles values is :

Chloride < dichromate < acetate < formate < oxalate < lactate < citrate calgon < Tartrate < control

On further myrobing, the water solubles contents are decreased in each case : The order is :

Chloride < Acetate < formate < tartrate < Citrate
Calgon oxalate
8·4 lactate
dichromate

The range is 8.4 — 9.8% as compared to myrobed control 12.4%

NaX added to Tanliquors : Series III :

The water solubles values vary and the order is :

Citrate < Tartrate < dichromate < formate < calgon < acetate < oxalate
13·2%
< control < lactate
16·4

In case of lactate, the water solubles content is even higher to that of control and the water solubles values in other cases are only slightly lower to that of control. The addition of salts to tanliquors thus may not be beneficial in reducing water solubles content.

On myrobing the water solubles content is greatly reduced — the range being 9.8% to 11.0% in case of salts as compared to control myrob. sample 12.4%.

CONCLUSIONS :

1. All salts increase the leather substance value and decrease the water solubles values of leathers.
2. NaCl, when used for pretreatment of the pelt, decreases the Yield, tensile strength, degree of tannage, water solubles values and increase the leather substance values as compared to control.
3. *Acetate :* When used for the pretreatment of the pelt, the values for tensile strength, leather substance are increased and yield, water solubles, degree of tannage, decreases as compared to control. When added to tanliquors, the yield, leather substance, and degree of tannage increased and tensile strength water solubles values decreased. The acetate addition helps to increase the yield, leather substance and decrease water solubles.
4. *Formate :* When used for the pretreatment of the pelt, an increase in yield, leather substance and a decrease in water solubles were observed. The presence of NaCl along with formate increased tensile strength and decreased degree of tannage. NaX — HX system appears to be better than NaCl — NaX — H_2SO_4 system in case of formate. The addition of formate to tanliquors is much more preferable to other systems for obtaining a better yield and higher degree of tannage.
5. *Oxalate :* Pretreatment of the pelt with oxalate results in low degree of tannage, tensile strength and yield values. Addition to tanliquors increases the yield but decreases the degree of tannage. In this system, the degree of tannage value is lowest for oxalate as compared to control and other salts. Thus oxalate treatment is not helpful in the vegetable tannage.
6. *Citrate :* When used for pretreatment, decreases yield and degree of tannage ; but when added to tanliquor, the yield and degree of tannage values are the highest recorded as compared to control and other salts. Adding citrate to tanliquors thus appears to be very beneficial.
7. *Lactate,/Tartrate :* Slightly decrease yield and degree of tannage when used for pretreatment but increase the same when added to tanliquors.
8. *Calgon :* Slightly decreases yield and degree of tannage when used for pretreatment of the hide or the tanliquor. The yield is however increased when it is added to tanliquors.
9. *Dichromate :* The yield is increased when added to tanliquor or when used for pretreatment of pelt without NaCl. The degree of tannage is increased when used for pretreatment of the pelt but decreased when added to tanliquor.
10. For obtaining the most desirable characteristics, the following salts used in a specific way as indicated below are helpful.

High yield :
Salts added to tanliquors — Series III.
citrate, calgon and formate.

Low water sols. content :
NaCl — H_2SO_4 pretreatment of pelt
Na acetate (Series I & II)
Na. oxalate — NaCl — H_2SO_4

High leather substance.

$NaCl — H_2SO_4$
Na dichromate — $NaCl — H_2SO_4$
Na lactate — $NaCl — H_2SO_4$
Na lactate — lactic acid.

High degree of tannage :

Na dichromate — H_2SO_4
„ — $NaCl — H_2SO_4$
Na formate || added to Tanliquors.
Na citrate ||

11. Further myrobing of wattle tanned leathers, decreases the yield, water solubles, degree of tannage values and increases the leather substance value.

    Where citrate is present, on further myrobing, the values for yield, tensile strength are the highest in all the systems as compared to other salts.

    Similarly, where dichromate is present, the values for degree of tannage for myrobed leathers are the highest.

    The values for leather substance and water solubles for myrob. tanned leathers are approximately the same for all salts and the values are slightly higher for Series III as compared to Series I & II.

12. The individual salt and the mode of its addition to the system appears to have an effect on the further myrobing of wattle tanned leathers.

Chem. & Phys. Div.
13—6—1956

EFFECT OF ACIDS AND SALTS IN VEGETABLE TANNING: PART III:

The Effect of pretreatment of the pelt or the liquor with a number of Salts on wattle, wattle and Myrob, tannage of Sole Leather

Y. NAYUDAMMA, K. S. JAYARAMAN & T. S. KRISHNAN.

In Part I of the studies, the effects of a number of salts on the penetration of tannin and shrinkage temperature during the course of tanning and the layerwise distribution of fixed tannin, hide substance and other chemical constituents in wattle tanned leathers were discussed. In Part II, a comparative study was made on the effects of these salts and the effect of further myrobing on chemical and physical properties of wattle tanned leathers. Each salt was used in three different ways, namely, $NaCl + NaX + H_2SO_4$ system (Series I) ; $NaX + HX$ system (Series II) ; — Series I & II for pretreatment of the pelt to pH 4.8 and in Series III, the salt NaX was added to tanliquor. The effect of the different methods of addition of each salt in the system (for the pretreatment of pelt or tanliquor) and the effect of further myrobing on chemical and physical properties of wattle tanned leathers are compared and discussed in this paper.

EXPERIMENTAL :

The leathers were prepared and analysed as described in Part I of these series.

DATA AND DISCUSSION :

The comparative data for each salt when added in 3 different ways to the system, as compared to the control for a number of physical and chemical properties of leathers are given in Fig. 1.

CHEMICAL PROPERTIES :

Fixed tans : (For wattle tannage)

1. As compared to control $NaCl + H_2SO_4$ pretreatment of pelt increases the fixed tan content slightly from 28.0% to 29.%

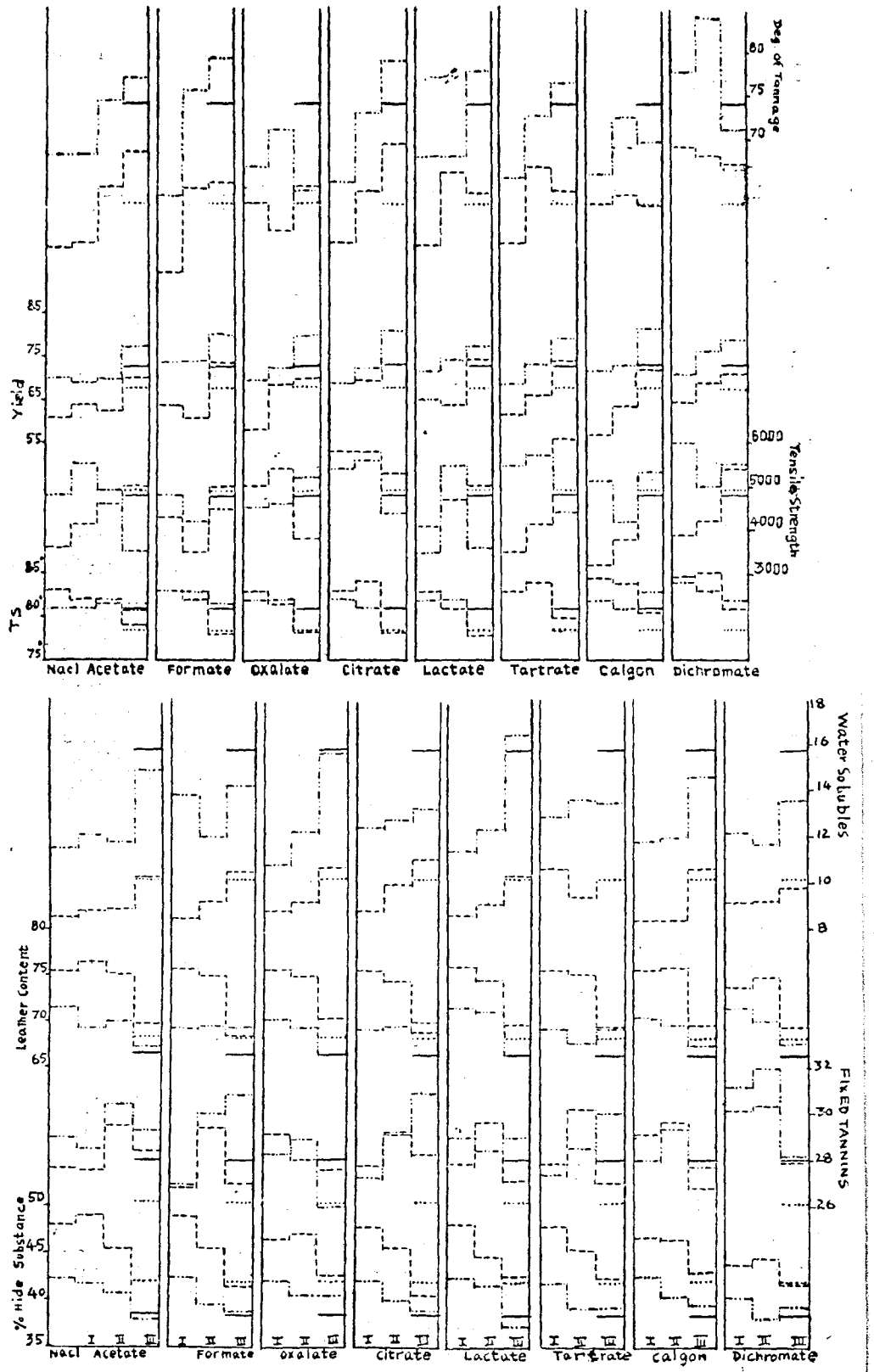


FIG. 1

2. For each salt, the order for highest fixed tan value in the 3 different systems is as follows :

		Series :
1.	Acetate	II > III > I > Cotrol
2.	Formate	III > II > Control > I
3.	Citrate	III > II > Control > I
4.	Tartrate	III > II > Control > I
5.	Lactate	III, I > II > Control
6.	Oxalate	II > I > Control > III
7.	Dichromate	II > I > Control, III
8.	Calgon	II > I, Control > III

For obtaining a higher percentage of fixed tans, adding the salts to tanliquor is best in case of formate, citrate, lactate and tartrate (mostly hydroxy acids) ; whereas the buffer system (NaX + HX) of pretreatment of the pelt is best in case of oxalate and acetate and in the system of calgon and dichromate to which H_2SO_4 is added.

4. The lowest values are obtained for fixed tans where the salts are added to tanliquors in case of dichromate, calgon and oxalate whereas the same when used for pretreatment of the pelt (HaX + HX) gave highest values ; whereas the trend is reversed in case of formate, citrate, lactate and tartrate which gave highest values for fixed tans when added to tanliquors and low values when used for pretreatment of the pelt.

On further myrobing :

1. The trends for fixed tan values are as follows :

		Series :
1.	Acetate	II > III > I > Control - Same as wattle tanned
2.	Formate	II > III > I > Control - Changed from ,,
7.	Oxalate	I > II > III > Control - Changed from ,,
4.	Lactate	II > I > III > Control - ,, ,,
3.	Citrate	II > III > I > Control - ,, ,,
8.	Tartrate	II > I > III > Control - ,, ,,
5.	Calgon	II > II > III > Control Slight change
6.	Dichromate	II, I > III > Control ,,

2. From the above order it is seen that, on further myrobing, the order for fixed tans for different systems, changes as compared to the order in wattle tannage except in case of acetate. In case of

calgon and dichromate also, the change is very slight. In these cases, the control value is lower to that in Series III whereas the reverse is the case in wattle tannage.

3. The highest values for fixed tans were obtained in Series II with all salts except oxalate ; the lowest values were obtained for Series III with all salts except acetate, formate and citrate.

4. The mode of addition and the nature of salt has thus a definite effect on the fixed tannins not only on wattle tannage but also on the subsequent myrobing.

Leather substance : (*L.S.*) (For wattle tannage)

1. As compared to control (no salts), the values for L.S. are always higher where salts were used whatever be the mode of addition.

2. The trends are as follows for the series :

	Series :	
	(63·5)	
1. Acetate	II > I > III > Control	(Range 67·5-69·5)
2. Formate	II = III > I > Control	(69·5)
4. Oxalate	I > II > III } Control }	(70·5 - 66·5)
3. Citrate	III > II > I > Control	(70-69)
7. Lactate	I, II > III } Control }	(71·5-66·5)
8. Tartrate	I, III > II > Control	(69-68 0)
5. Calgon	I > II > III > Control	(70·5-67·5)
6. Dichromate	I > II > III > Control	(71·5-67·5)

3. From the figure, it is observed that in all systems, the values are approximately equal, particularly so in case of formate, citrate, tartrate and acetate.

4. The highest values were obtained for L.S. in Series I for calgon, dichromate, tartrate, lactate, oxalate and the lowest values in Series III in all cases except tartrate and citrate.

On further myrobing :

The trends for L.S. are as follows :

Acetate	I > II > III > Control
Formate	I > II > III > Control
Oxalate	I > II > III > Control
Citrate	I > II > III > Control
Lactate	I > II > III > Control
Tartrate	I > II > III > Control
Calgon	II, I } > III > Control
Dichromate	II > I > III > Control

1. With all salts, the L.S. value increase as compared to wattle tannage.

2. The general trend is that the values for Series I & II are greater than Series III in all cases.

3. The values obtained for Series III are very close if not equal to those of control whereas in Series II & I, the values are much higher as compared to control.

Degree of Tannage : (*D.T.*) (For wattle tannage)

1. The trends for D.T. values are as follows :

1. Acetate	III > II > Control > I
2. Formate	III > II > Control > I
3. Oxalate	Control > II > I > III
5. Citrate	III > Control > II, I }
4. Calgon	Control > II > III > I
8. Dichromate	II > I > Control > III

2. Addition of salts to tanliquors (Series III) is better to other systems to increase D.T. value with acetate, formate, citrate, lactate and tartrate. But with all these salts the D.T. values are the lowest when they are used for pretreatment of the pelt along with NaCl ($NaCl + H_2SO_4 + NaX$ Series I). In case of hydroxy acids, the D.T. values are lower to that of control in both Series I & II where they were used for pretreatment of the pelt.

3. High values for D.T. were obtained with dichromate, calgon, and oxalate when they were used for pretreatment of pelt without NaCl ($NaX + HX$ system, Series II). But in case of calgon and oxalate, even in this system, the D.T. values are lower to that of control. In all these cases, the lowest values for D.T. were obtained when they were added to tanliquors.

On further myrobing :

1. The D.T. values in all systems and with all salts are reduced as compared to wattle tanned leathers.

2. The trends for D.T. values are given below :

	Series :
Acetate	III > II > Control > I
Formate	III > II > Control > I
Citrate	III > II > Control > I
Lactate	II > III > Control > I
Tartrate	II > III > Control > I
Oxalate	III > I, control } > II
Calgon	II > III, I } Control
Dichromate	I > II > III > Control

3. In case of acetate and formate, the trend is the same as in wattle tannage. Citrate also behaves similar to acetate and formate in this case.

4. The lowest values were obtained in Series I with acetate, formate, citrate, lactate and tartrate. This trend is the same as observed in wattle tannage.

5. With oxalate, calgon and dichromate, the myrob-tanned leathers give trends different to the wattle leather. In case of calgon and dichromate, the D.T. values are approximately the same for myrob-tanned leathers whatever be the mode of addition of the salt.

6. In almost all cases, the D.T. values are higher where salts were used as compared to the control (no salts) myrobed sample except in system I where NaCl is added.

Water Solubles : (W.S.) *For Wattle tannage* :

1. The trends for W.S. values for different systems are as follows :

	Series :
Acetate	II < I < III < Control
Formate	II < I < III < Control
Dichromate	II < I < III < Control
Oxalate	I < II < III < Control
Citrate	I < II < III < Control
Lactate	I < II Control < III
Tartrate	I < III < II < Control
Calgon	I < III < II < Control

2. In all the systems, the W.S. values are lower to the control with all salts.

3. Series III gave the highest values and Series II & I gave lowest values in all cases. Lowest values were recorded in Series I for oxalate, calgon, lactate and acetate (where NaCl is present) and in Series II for formate, acetate and dichromate.

4. $NaCl + H_2SO_4$ pretreatment of pelt gave a low value for W.S. content.

On further myrobing :

1. With all salts and all systems, as well as control, the W.S. content is decreased as compared to wattle tannage.

2. The trends are as follows :

	Series
Acetate	I, II < III, Control
Formate	I < II < Control < III
Oxalate	I < II < Control < III
Citrate	I < II < Control < III
Lactate	I < II < III, Control < I
Tartrate	II < III, Control < I
Calgon	I , II < Control < III
Dichromate	I , II < III < Control

3. Excepting the case of tartrate, the order is almost the same in all cases in that the W.S. values are lower in Series I & II as compared to Series III and control. This trend is similar to that observed in wattle tannage alone.

4. The values in Series III are equal to, if not higher, to that of control.

These results indicate that both in wattle tannage, and on further myrobing, to obtain the desirable low water soluble content, it is better to use salts for pretreatment of the pelt and not for adding to the tanliquors.

PHYSICAL PROPERTIES

Yield : *Wattle tannage* :

1. The trends of yield values for the different systems for each salt are given below :

		Series
1.	Acetate	III > Control > II, I
8.	Formate	III > II, I > Control
2.	Oxalate	III > Control ≳ II > I
3.	Citrate	III > Control ≳ II > I
4.	Lactate	III > II > Control > I
5.	Tartrate	III > II > Control > I
7.	Calgon	III > II, Control > I
6.	Dichromate	III > II Control > I

2. With all salts, the yield values are higher in Series III as compared to other series. The values in Series I are the lowest

recorded for all salts. The values obtained in Series I are in most cases even lower to that of control. NaCl + H_2SO_4 system also gave the lowest value for yield and NaCl system thus appears undesirable from the point of view of the yield which is an important factor in sole leather tannage. To obtain a high yield, the addition of salts to tanliquors appears to be the best method.

3. Pretreatment of the pelt with or without the addition of NaCl will result in low yields as compared to control (no pretreatment), in case of acetate, oxalate, citrate, lactate and tartrate. Pretreatment of pelt with salts of hydroxy acids is thus undesirable.

On further myrobing :

1. The trends are as follows :

		Series
1. Acetate	III >	Contral > I > II
2. Formate		do
3. Lactate		do
4. Oxalate	III > II	Control > I
5. Citrate		do
7. Tartrate	III >	Control > II > I
8. Calgon	III >	Control > II > I
6. Dichromate	III >	Control > I

2. In all cases, the values are much higher in Series III as compared to other series and control. This trend is the same as observed for wattle tannage.

3. The values are lowest in Series I in all cases. This trend is also the same as in wattle tannage.

4. The yield values become lower on myrobing wattle tanned leathers with all salts and in all series.

TENSILE STRENGTH (T.S.)

Wattle tannage :

1. The trends for different systems for each salt are given below :

	Series
1. Acetate	I > II > Control > III
3. Formate	I, Control > III > II
4. Oxalate	III > Control > II > I
6. Citrate	II > I > Control > III
8. Lactate	II > Control > III > I
7. Tartrate	II > I > Control > III
5. Calgon	III > I > Control > II
2. Dichromate	I > III > II > Control

2. In Series I, (NaCl + NaX + H_2SO_4 system)—Acetate, formate and dichromate helped to increase the T.S. as compared to other systems and control.

In Series II, the hydroxy acid salts increased the T.S.

In Series III, only calgon increased the T.S. of leathers. No further conclusions are warranted from these data.

On further myrobing :

1. The T.S. values are increased (as compared to wattle tannage) in case of acetate, formate, citrate, lactate, tartrate in Series III ; in case of oxalate, citrate in Series I & II and in case of lactate in Series I.

2. The T.S. values are decreased in all Series I-III, in case of calgon & dichromate.

In Series III, the values are slightly lowered in case of oxalate, calgon & dichromate.

In Series II, the values are slightly lowered in case of acetate, formate. lactate, tartrate, calgon & dichromate.

In Series I, the values are slightly lowered in every case except lactate.

CONCLUSIONS :

1. Pretreatment of the pelt with acids and salts under study increase the leather substance and lower the degree of tannage, water solubles, yield as compared to the systems where salts were added to tanliquors or to the control where no salts were added. Lowering of water solubles and increasing leather substance values are in favour ; but the lowering of yield and degree of tannage are against the use of these systems namely pretreatment of the pelt with acids and salts prior to tanning.

2. In the pretreatment of pelt, where NaCl is present, the values for the degree of tannage, yield and water solubles contents are much lower as compared to the systems where NaCl is not present.

3. *Addition of salts to tanliquors (Series III) is helpful to increase yield and degree of tannage* ; but the increase in the water soluble content is a disadvantage. The leather substance value is approximately equal to the control, though they are much lower than the values obtained where salts were used for pretreatment of the pelt.

4. The pretreatment of the pelt with salts of inorganic acids like dichromate, calgon (and oxalate) *help to increase the fixed tannin content,* whereas when added to tanliquors, the fixed tannin content is much lowered. This trend is reversed in case of hydroxy acids where the addition of salts to tanliquors increases fixed tan content.

5. Further myrobing of wattle tanned leathers, tend to increase *leather substance* values and *decrease degree of tannage, water solubles and yield values.* The trends obtained for wattle tanned leathers showing the effect of the mode of addition of salt, are maintained on further myrobing the leathers in case of hide substance, leather substance, degree of tannage, water solubles and yield values.

6. In all systems, whether the salts are added to the pelt or the tanliquors, they generally tend to increase fixed tans, leather substance and yield and decrease water solubles excepting in a few cases. These are definite advantages gained by using salts.

Chem. & Phys. Div. C.L.R.I.,
13-6-1956.

CLASSIFIED ABSTRACTS

PROCESSES PRIOR TO TANNING

SHORT LIMING FOR GLAZED KID. *V. Nespor Ceskoslov. Kozarstvi,* 3, 59-61 (1953). *Through C.A.,* 49, 7881 (1955). *Via. J.A.L.C.A.* **51,** 35, (1956). Short and long liming of glazed kid were investigated. Short liming is especially advantageous for smaller skins of av. (dry) wt. of 300 g. (2-3 foot leather). With long liming, the output of leather of 0.1-0.25 mm. thickness was 5-10 per cent from this wt. class. Leather from short liming is considerably fuller, less veiny, with smaller flank. The grain is somewhat pronounced, which is an advantage for these small skins. The pressure of glazing should be reduced. The short liming is advantageous also for larger skins, (4.5-5.5 ft.). The painted skins should not be piled, but rather suspended up on poles. The penetration of paint is more uniform and the hair is better.

LIME SLAKING FOR THE LIMING OF HIDES. *B. Plechac. Kozarstvi,* 5, 150-52, 170-72 (1955). *Via. J.A.L.C.A.* **51,** 8, 453, (1956). Mechanical contrivances for slaking lime are described. Use of 200-250 parts of water per 100 CaO is recommended. Circumstances favorable for slaking include small lump size, high purity, and soft water of a higher temperature. The slaked lime should " ripen " for at least 10 days. Sedimentation and utilization of a pure lime cream are recommended. Slaking in a rotating tannery drum is advocated.

TANNING

ON ARECANUT AND ITS SCOPE. *V. Raghavan and H. K. Baruah. Sci. & Cult.* **22,** 3, 150, (1956). Areca Catechu Linn., commonly known as arecanut or betel-nut is well known for its consumption as a masticatory in India, in the Middle and Far East. The import of betel-nut exceeds now more than Rs. 4,00,00,000 annually. There are four species of Areca, namely, A. *catechu* Linn., A. *triandra* Roxb. and A. *concinna* Thw., and A. *nagensis* Griff. The edible arecanuts belong exclusively to A. *catechu.* The fruit consists of two distinct parts, namely, the fibrous husk and the endosperm which is edible nut. The marked degree of astringency of the endosperm is due to the presence of considerable quantity of water soluble tannins which are deposited in the marbled streaks of the endosperm. The endosperm also contains some alkaloids which contribute to the narcotic and anti-helminthic properties of the nut in addition to fats, carbo-hydrates and minerals like calcium, phosphorus and iron. The authors have reviewed the origin and distribution, biology and pathology of the palm, biochemistry of the fruit and its uses.

V. V. S.

THE TANNING OF SOLE LEATHER. *M. Tomisek.. Kozarstvi,* **5**, 63-64, (1955). *Via. J.A.L.C.A.* **51**, 8, 452, (1956). After a review of sole leather tanning in different countries, analyses are given for British, U.S.A., and Czech leathers. Czech bends contain ash 1.7, fat 1.0, water solubles 12.5, hide substance 41.4, fixed tannin 30.8% ; pH of water solubles 4.3 ; difference figure 0.7 ; water absorption in 2 hours 31.8%.

QUALITY OF SOLE LEATHER. *M. Spicka, Kozarstvi,* **5**, 24-8 (1955). *Via. J.A.L.C.A.* **51**, 8, 452, (1956). The quality of Czechoslovak sole leathers is discussed. The use of high percentages of syntans, sulfited quebracho, and sulfited spruce bark extract, as well as oiling with sulfited oils, raises the amount of SO_2H groups in the leather which leads to high water absorption. Experimental tannages (results to be published later) are described. These include replacement of sulfited quebracho by wattle, elimination of sulfite in the extraction of spruce, and reduction of proportion of syntans from 30 to 20%.

PRODUCTION OF CHROME-VEGETABLE-TANNED SOLE LEATHER IN CZECHOSLOVAKIA. *M. Tomisek, L. Kucka and M. Minarik. Kozarstvi,* 5, 208-10, 227-8, (1955). *Via. J.A.L.C.A.* **51**, 8, 445, (1956). Processes used in U.S.S.R. and Czechoslovakia are described. Both involve a very light Cr tannage, following a conventional pickle. Vegetable tannage is done in drums (U.S.S.R.) or in suspenders followed by drums (Czechoslovakia). Data are given on tannin content of the sewered liquor from the final drum, with variations in the total amount of tannin given, the composition of the blend, and the number of drums and suspenders. It is concluded that the process is economically feasible only if suspender liquors are used. Analytical data are given on U.S.S.R. and Czech Cr-vegetable sole leathers compared to vegetable sole leather. The thermal stability of the Cr. vegetable leather is higher, but the tear resistance is lower, and the fabrication of insoles is more difficult. The bends are used in the shoe factory without difficulty, but the insoles are not suitable for Goodyear welt shoes. The results do not support the conversion of large sole-leather tanneries to chrome-vegetable tannage. The time of tannage was shortened from 86 to 39 days.

HIGHER QUALITY OF SOLE LEATHER. *A. Kala. Ceskoslov. Kozarstvi,* 3, 154-6, 181 (1953). *Through C.A.* 49, 7885 (1955). *Via. J.A.L.C.A.* **51**, 1, 36, (1956). The physicomech. evaluation of sole leather is more important than the chem. A higher content of syntans usually raises the H_2O-absorption value and abrasivity. The hydrothermic stability (I) (loss of tensile strength after 24 hrs. at 50 and 100 per cent relative humidity) can be raised by chrome pretannage. K. has followed these properties on different types of tannage and methods of loading sole leather. I of normal sole leather is 15.4-22.2 per cent. In the same leather loaded with H_2O-sol. urea-HCHO condensation products, softened by coumarone resins, I is 87.0-93.4 per cent. In chrome-pretanned leather I is 86.0 per cent ; the H_2O absorption of these leathers is 39.1-45.5, 36.4-39.7 and 49.0 per cent resp. Resistance to abrasion (Stather and Herfeld, C.A. 33, 3627[2]) is 2790, 7540 and 6310 respectively.

MANUFACTURE OF SHRUNKEN GRAIN LEATHER WITH ALUM-TANNED HIDES FOR GLOVES. *A. Simoncini. Cuoio, Pelli, Mat. conci anti,* 32, 19, (1956). *Via. J.A.L.C.A.* **51**, 8, 445, (1956). Tanners frequently try to obtain shrunken leather, but the results are not always satisfactory because the operation is made empirically. They think that a good shrinkage is only possible with soft and bodiless hides ; on the contrary, a perfect shrunken grain is obtained with more consistent hides of sufficient thickness. The shrunken effect is obtained either by mechanical action or by chemicals. The hide is formed of fibers and fiber bundles crossing each other in all directions, and the tannage fixes the reticular structure in certain positions. During the tannage, when the hides are repeatedly folded, the fixed wrinkles form on the surface a net-like design. The formation of these wrinkles is facilitated by folding hides with the grain inward, by increasing the concentration of the tanning bath and the speed of the drum, etc. The chemical action which may provoke the shrinking of the leather consists in the fixation of the surface layer, followed by a treatment which may swell the internal layers. In this case the surface fibers do not follow the lengthening of the underlying fibers, the hide undergoes a shrinking and forms on the grain a series of parallel and crossed wrinkles. To achieve this it is necessary to pretan the hides in such a way that only the surface layer is tanned (not more than 25% of the thickness) with very astringent vegetable matters added in the drum in the dry state or, in the case of chrome tannage, with concentrated and highly basic chrome liquors, using a temperature higher than the normal and a rapid turning of the drum. In alum tanning, the shrinkage is better obtained with chemical than with mechanical treatments. An example of the tanning method is the following : the hides are drummed at 20 rpm with 1% NH_4OH and 5% NH_4Cl in 200% water for 1 hour at 38°C and, after a short washing with cold water, with 20% of finely powdered sumac leaves for 20 minutes. The shrinkage is done with Tanigan Extra Q 70%, formic acid 12%, water 50% at 38°C for 3 hours. The last bath is a chrome liquor with 8% Cr_2O_3 of 45% basicity and 200% water applied for 2 hours. It is necessary to basify the bath after this time because the natural acidity of the hides partially neutralizes the alkalinity of the liquor. The drumming is continued for 2 hr., then the hides are allowed to stand for 24 hr. and neutralized with 3% $NaHCO_3$ in 300% water at 35°C. Fatliquoring is a very important operation ; the shrunken leathers show a rather low resistance to tearing which may be increased by appropriate fatliquoring, for example, with a blend of 3% egg yolk and 3% neatsfoot oil. Dyeing is done with acid colors, and for the darker colours the use of a mordant (potassium bichromate) may permit a reduction of the dye percentage.

SALTS AND ACIDS IN NATURAL TANNING MATERIALS, SYNTANS, AND TANNING LIQUORS. *V. Kubelka and A. Blazej, Kozarstvi,* 5, 235-38 (1955). *Via. J.A.L.C.A.* **51**, 8, 444, (1956). To eliminate the error caused by introduction of salts in the pelt, salts were determined by potentiometric titration to pH 6, before and after passage through a cation exchange, in liquors as prepared and also after detannizing with hide powder by the filter bell method. Materials analyzed included spruce and valonia extracts, Syntan K_1, "Naphthalene-difen", and Kortans KN and Qul. The salts absorbed from some syntans by pelt are supposed to be neutralised acid radicals of the syntan ; therefore not all salts removed by cation exchange resins are to be considered as

non-tannins. Tanning materials for which the salt content is lowered during tanning contain cations that form a part of the "tannin". The Cheshire-Brown-Holmes method is suitable for determining salts in vegetable tanning materials, but not in syntans containing "tanning" salts.

THE FUNDAMENTALS OF TANNING WITH SYNTHETIC TANNING MATERIALS. AN ATTEMPTED CLASSIFICATION OF ORGANIC TANNINS. *A. Kuntzel. Das Leder*, 6, 200 (1955). *Via. J.A.L.C.A.* **51**, 8, 447, (1956). The following classification is proposed :

I. Aromatic tannins
   - A. With cationic charged groups
     1. Cationic tanning materials (aniline derivatives).
     2. Amphotannins (a) synthetic phenolic amphotannins. (b) Amphoterized vegetable tannins.
   - B. Without substantivity
     1. Condensed naphthalene sulfoacids.
     2. Phenolic auxiliary tannins.
     3. Lignin sulfoacids.
   - C. With substantivity
     1. Polysulfonamides.
     2. Phenolic exchange tannins.
     3. Vegetable tannins.

II. Aliphatic tannins
   - A. Natural fats.
   - B. Polymerizates
     1. Train oil polymerizates.
     2. Vinyl polymerizates (a) Prepolymerizates (du Pont G 942). (b) Polymerization in hide. (1) Water-free. (2) In aqueous emulsion.
   - C. Diepoxide, epichlorhydrin, etc.
   - D. Paraffin sulfochloride (Immergan, skelt).
   - E. Alky sulfate (Lorikal).

III. Resin tannins
   - A. Dicyandiamide-formaldehyde resins
     1. Modified dicyandiamide resins (Chemtan R6, Retingan R6, Drasils).
     2. Simple dicyandiamide resins (Chemtan R33).
   - B. Condensation tannins (Urea or melamine methylol compounds).
   - C. Polyaddition compounds (di-isocyanate, Gerbstoff H).

IV. Tanning aldehydes and Quinone
   - A. Mixed unsaturated dialdehydes (chamois tanning).
   - B. Glyoxal, methylglyoxal.
   - C. Formaldehyde in combination with many tannins of the other groups.
   - D. Quinones.

All tannins with high astringency, good filling action, and capable of being used alone for tanning are aromatic tannins. The benzene ring plays an important role in the affinity for hide substance as it permits formation of dipoles. The phenolic hydroxyl is not as important in tanning as it was formerly thought to be. The tannins with dipole groups are classed as substantive or direct combining syntans. Non-substantive tannins have no important dipolar groups and combine with hide by salt bridges between the basic groups of hide and sulfo groups of the syntan. The dividing line between these groups is not sharp and depends among other things on the degree of sulfonation. Lignin recently has been modified to form a substantive tannin. The substantive class tan is neutral or slightly acid solutions, but the non-substantive tannins require acid to develop their tanning power. The amphotans are a new class of tannins. The tannins of the second main group are mainly hydrocarbons with groups (usually end groups) containing oxygen and sulfur. The only nonsynthetic members are the natural fats. In chamois tanning the oil polymerizes, coats, and separates the hide fibres. Treatment of leather with prepolymerized resin is usually referred to as impregnation. Treatment in an aqueous emulsion with a catalyst so that some polymerization occurs within the leather is referred to by Batzer as polymerisation tannage. The principal use of tannins of the aliphatic class is to make soft, supple leathers such as chamois and glove. Because their tanning ability is limited, they have restricted uses alone for tanning leather, but they are used in combination with a wide variety of more active tanning materials. Tannins of the third main group are useful for filling and increasing cutting value of flat, empty chrome leathers without changing their chrome character. They are important now when cattle hides are being used increasingly for upper leather instead of sole leather. The oldest group of resin tannings, the methylol compounds of urea, melamine and recently furans, do not tan but are used to fill between the fibers. They are always used with formaldehyde. The dicyandiamide-formaldehyde condensates are prepared so that a slight change in pH will precipitate them. The tannins of the fourth main group are all synthetic. They have great tanning power but no filling ability, and therefore are used with other materials.

MODERN RESIN TANNING MATERIALS, THEIR PROPERTIES AND USES. *R. Heyden and J. Plapper. Das Leder*, 6, 215 (1955). *Via. J.A.L.C.A.* **51**, 8, 446, (1956). The preparation of urea and melamine methylol compounds is reviewed. These cationic materials can be used only in small proportions with true tannins because when used alone they condense further and liberate formaldehyde so that the strength of the leather soon drops greatly. Anionic materials with good tanning

action can be made from the above compounds by blocking the reactive methylol group through combination with polyvalent phenols such as resorcinol, sodium sulfite or acetate, amino—or hydroxycarbonic or sulfonic acids, etc. The dicyandiamide condensation products of Sellet and Dawson are described. Bohme Fettchemic (Dusseldorf) have a new resin tannin, Drasil II, which can be diluted with hot or cold water to clear solutions, is not sensitive to acid or salts, but is precipitated by vegetable or synthetic tannins. It fills and improves either chrome or vegetable leather. A white, wash-fast, glove leather can be made by tanning sheepskin with 3-5% of this resin, 6-8% of Lorikal (an anionic fat product) and 1-2% of alum. Drasil I is a condensed anionic resin tannin that can be diluted in any proportion with water to form stable solutions. It is not sensitive to salt but precipitates below pH 6.0. It has a filling action when used as a pretan for chrome leather. The classical urea and melamine resins are fixed to hide and leather mainly by increase in molecular size, but the dicyandiamide resins are taken up by hide as cationic or anionic substances in the same way as other higher molecular ionic materials such as dyes or emulsifiers. They also can be deposited by precipitation with salts, acids, or oppositely charged materials.

THE TANNING OF A FULL CHROME LEATHER. *L. Masner. Kozarstvi*, 5, 153, (1955). *Via. J.A.L.C.A.* **51**, 9, 504, (1956). The addition of bactericidal surface-active agents to soak is recommended. An alkaline soak (pH 8-10) favors the growth of proteolytic micro-organisms. Addition of 300-500 g. of Pekorol M for salted, and 500-1000 g. for unsalted, hides, per 1000 l. of soak, is sufficient. The following procedure is recommended for side upper leather: Lime with 250% H_2O, 1.5-3% Na_2S (60%), and 0.3% Pekorol MFK for 14-20 hr. Delime and bate only the surface, at 32°C. for 45-60 min. Pickle with 100% H_2O, 10% NaCl and 1.2% H_2SO_4. The pH of the spent pickle (overnight) should be 2.8. Tan with 70% of a liquor containing 2.3% Cr_2O_3 in 4 feeds at 60-min. intervals. A retannage with 2% sulfited quebracho and 3% Tanigan Extra NR is recommended. Fuller leathers are obtained by tanning with 70% of a liquor containing 1% Cr_2O_3 at 33% basicity, horsing, and retanning with 80% of liquor containing 2.5-3.0% Cr_2O_3, raising the pH to 4.0 after 2 hr. as described above. The leather is horsed for 48 hr., shaved, neutralized, and again retanned with 150% liquor on the shaved weight, containing 1-2% Cr_2O_3 (41-50% basicity). The tear resistance of this leather is of course lower. Fuller leather may also be obtained by using unsulfated neatsfoot oil in fatliquoring.

VEGETABLE TANNING OF PRECHROMED HIDES. *L. Masner. Caskoslov, Kozarstvi*, 3, 86-7 (1953). *Through C.A.* 49, 7881 (1955). *Via. J.A.L.C.A.* **51**, 1, 34, (1956). Hides for sole leather are pickled at 18-22° in 9-120 per cent H_2O, 6-8 per cent NaCl, 0.8-1.3 per cent H_2SO_4 (100 per cent) for 8-14 hrs. the pickle contains 75-80 g. Na Cl/1. and after pickling, 0.2-0.5 g./1. H_2SO_4. The pH on the surface of hides is 3.6-4.0, in the middle 5.5. To the exhausted pickle a liquor contg. 0.4-0.8 per cent Cr_2O_3 of 39-42 per cent basicity is added. The tanning lasts 16 hrs. and the pH on the surface of the hide is 4.4-5.0, shrinkage temp. (Ts.) 76°. For the vegetable tannage in a drum in 120-160 per cent liquor, 24-7 per cent tannin is necessary. For sole leather 20 per

cent of the amt. is syntans. The temp. of tanning rises from 26-32° to 40-5° for firm sole leather and to 34-40° for Goodyear welt sole leather. For vegetable tanned upper leather the hides are pickled in 80-100 per cent liquor 3-6 hrs., with 6-7 per cent NaCl and 0.8-1.0 per cent H_2SO_4. The surface pH of the pickled hides is 3.6-3.8, the middle 4.5-5.0. Chrome tannage in pickle is done with 0.4-0.6 per cent Cr_2O_3, 40-5 per cent basicity, 5-7 hrs., at 18-20°. The surface and the centre of the leather have a pH of 4.4-5.0, Ts 76°. The vegetable tannage is done in two drums with 12 per cent of pure tannin (upto 40 per cent syntans) in 100-180 per cent of liquor. The temp. rises from 20 to 30°. The pH of the tanning liquor (4.2-5.2) is adjusted by Na_2SO_3. In the tanning liquor 2 per cent of sulfonated oil is used. Liquors are changed after 5 packs of hides. It is also possible to pickle hides for upper leather to pH 4.0-4.2 as above, and tan in pickle with 0.5-0.7 per cent Cr_2O_3, basicity of the 40-5 per cent, 5-7 hrs. at 18-20°. The pH of the surface of hides is 4.0-4.5, Ts min. 80°. The tannage in the drum follows in 110-40 per cent of liquor at 28-32° 10-12 hrs., with lignin ext. (7-9 per cent pure tannin on pelt) or 11-14 per cent on shaved wt., pH 4.0-4.2. After tannage, the leather is washed with H_2O at 20-5° for 20-30 min. There follows a second chrome tannage with 80-90 per cent liquor at 18-20, 5-7 hrs. 3 per cent NaCl and, after 5-8 min., 0.6-0.7 per cent Cr_2O_3 of 40-5 per cent basicity are given. The pH of the leather, 4.0-4.2, is adjusted by means of Na_2CO_3. After the second tannage the leather is washed 30-60 min. H_2O at 20-2°. The fatliquoring of firm sole leather is adjusted to give 2-3 per cent fat, for Goodyear welt sole leather 3.5-4.5 per cent, for upper leather 20-2 per cent. For the filling of sole leather 1.5-2.0 per cent $MgSO_4$. $7H_2O$ and 5 per cent glucose are used.

PROCESSES AFTER TANNING

WATER-PROOFING VEGETABLE TANNED SOLE LEATHER. KW *Pepper, Lea. Tr. Rev.* **120**, 3657, 271, (1956). The extension of wear trials and probable incorporation of polymers into chrome retan and full chrome in the same way as water-proofing vegetable tanned flexible bends is programmed for the future work of B.L.M.R.A. Various attempts to improve wear resistance failed to give the desired effect. Only vegetable tanned leather impregnated with poly *iso* butylene gave 50% improvement. It is expected that the addition of 10-20% of synthetic polymers which are known to possess great durability in wear, would improve the wear resistance. Out of three methods of getting synthetic polymers into leather, the polymerisation *in situ* has the disadvantage of making sure of required polymerisation reaction and preventing the evaporation of valuable material and tendency of some tannins to prevent polymerisation though the penetration is uniform. In the case of impregnating polymer from solution there is the difficulty of depositing the required amount uniformly. Impregnation from emulsion or suspension is by far the most important from the practical point of view though the trials were not yet successful with the impregnation of sole leather. It is claimed that zirconium pretannage followed by a vegetable retannage gave a leather of improved wear resistance of chrome retan without its disadvantage of poor water repellance. Loose tans had to be fixed by preliminary treatment for water repellant to be effective in the case of water-proofing.

K. S. R.

INFRARED DRYING IN THE SHOE AND LEATHER INDUSTRY. *H. Herfeld and R. Bellmann. Ges. Abhandl. Deut. Lederinsts. Frieberg/Sa., No.* 11, 79-98 (1955). *Via. J.A.L.C.A.* 51, 6, 328, (1956). Infrared drying tests were done on six different leathers : box calf, calf suede, pig upper (all Cr-tanned), pig "Futterleder" (fully Cr-tanned and lightly vegetable-retanned), "Juchtenleder" (very lightly Cr-tanned and heavily vegetable-retanned), and vegetable sole leather. Results on the sole leather were wholly unfavourable ; the leather was badly damaged. The leathers contained 40-60% water. Drying was done in the open with a bank of infrared lamps. The number of lamps per sq-meter, and the distance from the lamps to the leather were varied. Drying was done either on wood blocks or on frames. All the leathers were dried to 15-17% water. Control pieces were oven-dried at 50°C. (Cr leather) or 30° (vegetable leather). Data are reported for drying time, maximum surface temperature (non-uniform over the piece because of uneven irradiation), and differences between the experimental and control pieces with respect to tensile strength, elongation at break, and area. The drying time varied from 13 to 60 min. for calf and pig leathers (controls 120-200 min.), and from 25 to 120 min. for Juchtenleder (controls 10-27 hrs.), depending on intensity of irradiation, initial water content, and leather thickness. Drying was faster on wood blocks than on frames. Irradiation from both sides reduced the drying time by half. No consistent difference was found between flesh-side and grainside irradiation. Maximum temperatures varied from 95° (!) to 34°C. Surprisingly, these high temperatures produced no visible damage, even with the lightly chromed Juchtenleder, but the more intensely irradiated leathers did show losses in tensile strength (upto 15%), elongation at break (upto 12%), and area (4-5%), compared to the oven-dried controls. The authors specify the infrared drying conditions (for their particular setup) that they consider safe. Power costs are tabulated. The authors are sceptical about the economic practicability of infrared drying of wet leather (*e.g.*, after colouring), but this does not apply to drying of inishes on leather or shoes, where the amount of water or solvent to be removed is much less, the exposure time short, and the advantages of rapid drying are more important. Tests in which various solvents were evaporated from calf leather by infrared showed some loss of strength due to overheating when attempts were made to expel the higher boiling solvents too rapidly. Pigmented nitrocellulose films, formed on mercury, lost up to 25% of their initial strengths when irradiated too long or too intensely. Films of egg albumin, nitrocellulose, and an unspecified "binder" applied to leather were examined microscopically for cracking when the leather was stretched. Excessive infrared irradiation markedly reduced the elasticity, most markedly for egg albumin and least for the "binder". The authors advise strongly that protein and nitrocellulose finish films should not be exposed to infrared for more than 5 or at most 10 minutes after drying is complete.

PASTE DRYING OF LEATHER. *L. Masner. Kozarstvi*, 5, 193-94 (1955). *Via. J.A.L.C.A.* 51, 8, 443, (1956). The pelts should be left 0.1-0.2 mm. thicker than normal after splitting. The leather should contain 2.8-3.5% Cr_2O_3 and should be neutralized to pH 5.0-5.5 in the centre and 6.5-6.7 on the surface. Retanning with 3-12% of a specially

prepared quebracho is useful, but the tannin should not strike through. The leather should contain 25% more fat than normal. In leathers containing 2.8-8.1% total fat, the grain should contain 8.5-19.7% fat. A double fatliquoring is recommended : first, a penetrating fatliquor containing 2% degras and 1.75% of a sulfated oil ; then a surface fatliquor with emulsified raw neatsfoot oil. The ratio of oil in the first to the second fatliquor should be 1.65:1 or 3:1 if the leather has been retanned with more than 7% pure tannin on the shaved weight. Penetration of paste is regulated by adding sulfated oil. About 75% of the paste should remain on the plates. Glass plates are most satisfactory. Suede leather and splits are pasted preferably with polymer latexes, which improve buffing characteristics or serve as a base coat. Eukasol Binder S diluted with 30-35% water is recommended. Pig leather is sometimes pasted on the flesh side, and simultaneously given a pigment coat on the grain. The paste should contain about 1% solids. Side leather is dried in 4-8 hr., to 12-15% H_2O. Sometimes the grain is improved by drying on the plates to 18-20% H_2O, followed by free drying. Drying of side leather begins at 50-60°C. and 35-40% relative humidity in the first section ; in the second section 45-50° and 45-55% relative humidity ; in the final section 42-45°, but always below the relative humidity. Vegetable upper leather is dried at 40-45°C., but always below the drop point temperature of the stuffing grease. Suede is dried at 40-45°C. and 40-60% relative humidity ; glazed kid, at not less than 50-60% relative humidity. The flow of air in the dryer should be horizontal, and the direction of flow should be reversed frequently. Continuous 3-shift operation is essential for uniform drying conditions. Gains in surface area of from 6 to 16% are possible, but it is bad practice to strive for the maximum area increase. A sample from the centre of a side should stretch atleast 20% at a tension of 1 kg. per sq. mm., otherwise the shoemaking becomes very difficult. Data on area changes, based on the initial area as 100, are given below :

Location	Per Cent of original area		
	Free-dried	Free-dried and toggled	Pasted
Butt	93.3	93.7	101.9
Shoulder	83.7	95.2	102.9
Belly	89.9	101.0	102.6

The more uniform stretching of pasted leather is obvious. The increases surface area of chrome leather is permanent, but a gain of 8% for vegetable leather was reduced to 4% after storing 3 weeks.

PATENT LEATHER PRODUCTION. *V. Pektor, Kozarstvi*, 5, 149-50 (1955). *Via. J.A.L.C.A.* 51, 8, 444, (1956): The best raw materials are light Liniers Frigoificos (10-12 kg. salted weight), young colts,

Czechoslovak light goatskins, or Szechuan goatskins. Chrome tannage must be done so as to produce a dense, compact grain. After fatliquoring, drying, staking, and toggling, the surface is degreased with gasoline. The varnish should be made from refined linseed oil, sp. gr. 0.925-0.935, iodine value 170-180, and unsaponifiable matter not over 1.5%. The oil is boiled till filaments 5 to 7 cm. long are produced. The filaments of the daub coat should be upto 2 cm. long. The varnish is sprayed at 2 atmospheres pressure at not less than 25°C. The first coats are air-dried, and the last coat in a cabinet at 45-55°C. Final hardening is done either in sunlight or U.V. light. Finally the leather is conditioned 24 hr. at 15°C. and 65% relative humidity to a water content of 14-16%.

A REVIEW OF ACTUAL, AND A PREVIEW OF FUTURE, FINISHING OF LEATHER. *V. Pektor. Kozarstvi,* 5, 45-6 (1955). *Via. J.A.L.C.A.* **51**, 8, 454, (1956). After a brief review of current processes, the necessity of using structurally soft synthetic resins is stressed. The Soviet method of utilizing polymethacrylates with addition of plasticisers before polymerization has also been tested. Several types of dispersions of synthetic resins of different elasticity and hardness are necessary for the successful finishing of shoe upper leathers. In Czechoslovakia a dispersion of a copolymer of 80% butyl methacrylate and 20% butyl acrylate, or a softer type (100% butyl acrylate) is used with casein-based pigments. The first coat is applied to wet hog leathers after setting-out, before first drying. Improved adhesion of the film results. This method has been advocated also for other types of shoe upper leathers. New types of more lively pigments are needed.

IMPREGNATION OF VEGETABLE-TANNED LEATHER. *I. Binko, Kozarstvi,* 5, 105 (1955). *Via. J.A.L.C.A.* **51**, 8, 452, (1956). A filler formula, taken from an encyclopedia published in 1798, is given. A mixture of nut oil 8, linseed oil 24, $ZnSO_4$ 8, and Pb (C_2H_3O) 8 parts is boiled slowly, and sedimented. Colophony 6, black tar pitch 3, wood tar 1.5, and turpentine 1.5 parts are added. The mixture is applied to dry leather.

PASTE-DRYING OF LEATHER. *B. Plechac. Kozarstvi,* 4, 65-70 (1954). *Through C.A.* 49, 7884 (1955). *Via. J.A.L.C.A.* **51**, 1, 36, (1956). The flow of air in driers is discussed. A slowly circulating, air-conditioned air current saves heat. A forced air-draught is necessary. The up-down direction of air flow is recommended. The down-up system gives slower drying. The poor holding of leather on glass plates is due to wrong technology of pasting. The head of the side ought to be upward ; this gives a more uniform distribution of tension during the drying. The H_2O content of chrome—and vegetable-tanned leathers was ascertained at different relative humidities of the atm. Cr-leaher gains and loses H_2O more quickly. The hysteresis of both leathers is about the same. A diagram of a 6-independent section pasting drier is given. The leather must be wrung to 55-60 per cent H_2O content before pasting.

TESTING

THE A.B.C. OF X.Y.Z. PRINCIPLES OF COLOUR MEASUREMENT. *John S. Mudd. The Lea. Tr. Rev.* **120**, 3661, 465, (1956). Colour control has become a practical proposition with the recent development of instrument for accurate and speedy measurement. The system of colour measurement which is known as C.I.E. system in Europe and I.C.I. system in America is based on the fact that any known colour can be matched by a mixture of three coloured lights in suitable proportions. The primary colours in this case are bright red, bright green and blue violet and not the familiar red, yellow and blue. An equilaterial triangle at whose verticies the three colours RGD are placed will represent immense number of other colours consisting of infinitely varying amounts of the three coloured lights. But any particular point will represent one definite colour only which can be given a numerical description in terms of the proportion of the three colours. Many pure colours of spectrum could not be included in this triangle line called spectrum locus which in its turn enclosed in a bigger triangle XYZ will describe every possible colour in positive amounts of X Y Z which are mathematically related to RGB. Equilaterial triangle was modified into right-angled triangle for convenience and this diagram is known as chromatocity chart. The variations in chromatocity and luminance are combined to give a T figure which represents the visual difference between a sample and a standard under ordinary practical conditions. A colourimeter enables us to receive a coloured material of the exact shade we require from a long distance and to know the position of the matched shade to the original in terms of T. Colour standard can be maintained within a set even though patterns may fade, or become discoloured on keeping or even lost altogether.

K. S. R.

A COMPARISON OF GAS CHAMBER TESTS OF BOOKBINDING LEATHER WITH A LONG TIME ATOMOSPHERIC EXPOSURE. *C.W. Beebe, R.W. Frey and M.V. Hannigan. J.A.L.C.A.* **51**, 1, 20, (1956). Twenty-four samples of bookbinding leathers, tanned in various ways, have been exposed as bookbindings to atmospheric pollution for periods of 12 to 19 years. Physical and chemical tests made after exposure correlate reasonably well with gas chamber tests made on the leather before exposure.

PAPER CHROMATOGRAPHIC DETERMINATION OF GELATIN WITH ACID ADDITIONS. *K. Heyns and W. Walter. Deut. Lebensm.-Rundschau,* 51, 65-7. *Through C.A.* 49, 9310, (1955). *Via. J.A.L.C.A.* **51**, 1, 34, (1956). Samples of normal and acidified gelatin (1 g. each) were dissolved in 100 cc. H_2O and kept in an incubator for two weeks at 48° or 21 days at 37°. The resulting solns. were dialyzed for 17 hours in 450 cc. distd. H_2O, and the diffusates evapd. under reduced pressure. Each residue was then taken up in 0.4 cc. H_2O, subjected to chromatography with a BuOH-AcOH-H_2O mixt., spraved with ninhydrin soln., and stored for a week in the dark before being evaluated. It was shown that acidified stored gelatin does not decomp. and acts and same as freshly acidified gelatin.

BONDING FILM ADHESION TEST FOR LEATHER FINISHES. *C.A. Burkart, N.D. Gallagher, and M.B. Neher. J.A.L.C.A.* **51**, 8, 418, (1956). A test has been developed for measuring the adhesion of finish to leather which gives results independent of other finish properties such as elasticity and flexibility. In this test, a copper strip is bonded to the leather finish by means of a heat-activated phenolic film (or "bonding film"). The force required to remove the copper strip, bonding film, and finish vertically from the leather surface is determined by conventional tensile-test apparatus.

The "bonding film adhesion test" has been applied to a variety of leathers under different conditions. In general, the finishes on kid leathers show very low adhesion values, cowhide shoe-upper leathers show intermediate values, and upholstery leathers show high values. Within prescribed limits, variation of temperature, pressure, and dwell time during preparation of the specimens do not significantly affect the adhesion values obtained. There are some kinds of finishes to which the presently available kinds of bonding film will not adhere satisfactorily.

Statistical analysis of the test was made on one set of experiments; the experimental error was found to be 0.39 lb. per inch based on 160 determinations. Therefore, the 95% confidence limits are 78 lb. per inch for a single test result.

PROBLEMS OF CHEMICAL ANALYSIS OF LEATHER. *V. Kubelka, Jr. and A. Blasej. Kozarstvi*, 4, 230-4 (1954). *Through C.A.*, 49, 7885, (1955). *Via. J.A.L.C.A.* **51**, 1, 36, (1956). The detn. of leather substances is of most interest. The determination of H_2O gives low results on leathers high in fats, which gain wt. on oxidation. Ash should be calcd. on hide substance, otherwise the conclusions may be false. Since inorg. compds. volotalize (NH_4 salts at 300-500, chlorides over 600), conversion to sulfate is perhaps best. The sulfated ash is 10-20 per cent higher than the original ash. By detg. fat with CCl_4 or petr. ether only true fats are obtained; oxidized fats must be extd. by Et_2O, hydroxy acids by a 1:1 mixt. of EtOH and $CHCl_3$, bound fats after hydrolysis with 15 per cent KOH, acidification with 15 per cent H_2SO_4, and ectn. with petr. ether. Glycerol is insol. in org. solvents. The pH of the aq. ext. does not det. acid already bound on leather after long storage. The detn. of N in leather may be influenced by the presence of N-contg. syntans, but not of NH_4 salts. The calcn. of leather substance according to Kubelka (C.A. 31, 8243[2]) is wrong for chrome-retan leathers. The authors propose, therefore, to calc. the leather analysis on hide substance. In the calcn. of leather substance of chrome leather, 1 per cent Cr_2O_3 is equiv. to 2.87 per cent Cr-tanning material in leather (Kubelka, C.A. 47, 9651i). Examples are given.

HIDE EVALUATION. THE SAMPLING OF CATTLE HIDES FOR THEIR LEATHER-MAKING SUBSTANCE. *C. Deasy. J.A.L.C.A.* **51**, 6, 271, (1956). Determinations of total nitrogen, hydroxyproline, water, and ash were made at 2, locations on each of ten brine-cured steer-hide sides. A location adjacent to the backbone and 20 to 28 inches forward of the root of the tail is most nearly representative of the average composition of the whole side.

EVALUATION OF INSOLE LEATHERS. *Charles W. Mann and Edward T. Steiner. J.A.L.C.A.* **51**, 6, 304, (1956). The results of a series of shoe-wearing trials on various types of insole leather are presented. The tannages and treatments for insole leather include processes such as the application of oil, formaldehyde vapor and aluminium salts as well as combination tannages. Outstanding results were obtained with the combination chrome-vegetable tannage which consistently performed beyond other processes in all the trials. An alum-vegetable tannage proved very satisfactory in one test but it was unsatisfactory in another. The formaldehyde-vegetable tannage also proved more resistant to cracking than the vegetable-tanned leather. Variations in the vegetable tannage were less effective in improving the quality of insole leather. The conventional chemical and physical tests of insole leather were not closely related to the results of the field trials. Other laboratory tests showed some promise for screening purposes in the selection of materials for further study but when used alone they did not prove reliable as a means of evaluation.

THE CHROMATOGRAPHY OF VEGETABLE TANNIS. *Z. Kotasek. Kozarstvi*, 95-97, 114-17 (1955). *Via. J.A.L.C.A.* **51**, 8, 453, (1956). The chromatography of extracts of spruce bark (*Picea excelsa*) is described. Whatman W-1 and Schleicher & Schull 2043 papers were used, with the following solvent mixtures: (a) n-butanol acetic acid-water (4:1:5); (b) a + 5 – 10% ethylene glycol; (c) butanol-pyridine-saturated NaCl solution (1:1:2); (d) ethyl acetate-acetic acid-H_2O-ethanol (3:1:3:0.5): (e) same as (d) in the proportions 2:1:2:0.33. The tannins of spruce bark contain at least 6 fluorescent compounds: 3 blue, 2 yellow, 1 brown-blue. The yellow spot with a high Rf value corresponds to a component of quebracho. Alkali extracts of spruce bark give no fluorescence even after removal of cations by ion exchange. Eight components give reactions of polyphenols. The fluorescent spots are connected by fluorescent blue bands. The sugars in the spruce non-tannins were chromatographed by a,c, pyridine-ethyl acetate-water (2:1:2); and butanol-pyridine-water (12:8:7). Rf values in *a* were rather low. Comparison with chemically pure sugars was made after removing anions and cations from the non-tannin solution. The most important aldohexise component is glucose; arabinose and perhaps xylose and ribose are also present, as well as some decomposed uronic acids. This indicates the presence of pectins, which affect tanning with spruce adversely because of their high viscosity. Other pentoses, ketohexoses, ditri and polysaccharides, as well as sugars bound as glycosides or polyphenols will be discussed in a later report. The pharmaceutical significance of tannins and flavanoids is mentioned, e.g., protection from irradiation by radio-isotopes. Other applications of chromatography in the leather industry (lime liquors) are indicated.

NEW ANALYTICAL METHODS IN TANNERIES. *A Stehlik. Kozarstvi*, 5, 35-7 (1955). *Via. J.A.L.C.A.* **51**, 8,453, (1956). The Bergmann or the Schooper apparatus for determining permeability of leather to air has been replaced by Fodor's apparatus (not described). The "Gost" (USSR) apparatus for determining permeability to water is being tested. The hydrohthermal test for determining the stability of

vegetable-tanned leather has been introduced. Replacement of hide powder by some better standardized polyamide, in tannin analysis, is advocated. A new method for the determination of organically bound SO_3 in sulfated oils (see Chem. Abstr., 49, 8615i) gives better results if an excess of H_2SO_4 is added, and back-titrated after removing CO_2 by boiling. Czechoslovak sulfated oils contain 2.3-5.0% organically combined SO_3. Sulfated oxyparaffine contains only 0.9%. An analytical evaluation of sulfochlorides has been worked out. S and Cl are determined in the Grote-Krekeler combustion apparatus. The combustion products are absorbed in alkaline H_2O_2 solution. The Cl content is always higher than the theoretical Cl : SO_2 relationship, and therefore Cl is bound also by addition or substitution. A good insight into the sulfochlorination process is given by determining the saponification value. The SO_2Cl content calculated from the equation $-SO_2Cl + 2\ KOH = -SO_3K + KCl + H_2O$ gives the same results as the polarographic determination of Majranovskij and Nejman (see Chem. Abstr., 46, 28e). For the polarographic examination of sulfochlorides used in tanning, cyclohexanone is a suitable solvent. A good mixture consists of 15 ml. 5 N Ca $(NO_3)_2$, 15 ml. cyclohexanone and 20 ml. ethanol. A cyclohexanone solution of the sulfachloride is added to this solution. The half-wave deplorization potential is near zero (to N calomel electrode). There is a lenear relationship between sulfochloride concentration and the height of the wave, unless the proportion of solvents is changed. A pure p-toluene sulfochloride was used to evaluate the curve by the method of standard increments. The determination is possible upto a concentration of 0.001 M sulfochloride. Higher concentrations give maxima on the curves, which can be depressed only with difficulty. A reverse exposition of polarograms, from a higher to a lower negative potential is advantageous : the wave develops better. A distinct Cl wave develops after the sulfochloride wave, permitting their simultaneous determination. This method can be used to determine the degree and rate of hydrolysis of the sulfochloride. The polarographic method may be used in controlling tannage by sulfochloride.

THE PREPARATION OF SOLID TANNING EXTRACTS FOR ANALYSIS. *John F. Wagoner. .J.A.L.C.A.* **51**, 9, 458, (1956). A new method for the preparation of solid tanning extracts using a Waring Blendor with a screen attachment is presented. The screen attachment is described, and analytical data to substantiate the use of this new method are presented. It is proposed that the method be considered by the American Leather Chemists Association for possible adoption as an Official Method.

THEORIES

THE RELATIONSHIP BETWEEN THE PHENOLIC CONTENT OF LIGNIN SULFONATES AND THEIR TANNING PROPERTIES. *H. B. Marshall and A. G. Newcombe. Pulp & Paper Mag. Canada,* 56, 101-5 (1955).. *Via. J.A.L.C.A.* **51**, 6, 327, (1956). In addition to work on condensation of lignisulfonic acid with phenols, which was published in JALCA 50, 85 (1955), the authors describe experiments in which lignisulfonic acid was demethoxylated by chlorination. Commercial, fermented, waste sulfite liquor was dialyzed, passed through a cationic exchanger to remove Ca, then through an anionic exchanger to remove low molecular

weight acids, chlorinated in the dark at room temperature, and freed from HCl by ion exchange. The ratio of Cl to dry lignin sulfonic acid was 191: 227. Half the Cl appeared to be bound to aromatic, and half to aliphatic, carbon atoms. Hydroxyl groups appeared to be formed by hydrolysis of ether linkages. Demethoxylation appeared to take place by successive formation of methyl alcohol and formic acid rather than methyl chloride. Some sulfonic groups were removed. Half the Cl was split off by treatment with NaOH. Tanning tests gave the following results :

Tannage	Weight yield	Shrik Temp. °C.	Colour	Softness of grain	Smoothness of grain
Dialyzed lignsulfonic acid	123	68.5	Medium	Hard	Fairly smooth
Same, chlorinated	135	75.5	Brown Medium brown	Rather hard	Smooth
Same, chlorinated and hydrolyzed	140	76.	Dark brown	Fairly soft	Smooth
Quebracho	170	84.5	Light reddish brown	Very soft	Very smooth

While the chlorination definitely improved the tanning properties this betterment was not considered sufficient o justify the high cost of such a process.

THE EFFECT OF THE PREVIOUS HISTORY OF SULFITE CELLULOSE LIQUORS ON THEIR TANNING PROPERTIES AND ON THE PROPERTIES OF SYNTHETIC REPLACEMENT TANNINS MADE FROM THEM. *F. Stather, H. Herfeld and R. Reich. Ges. Abhandl. Deut. Lederinsts. Freiberg/Sa., No.* 10, 5-15 (1954). *Via J.A.L.C.A.* **51**, 6, 326 (1956). Liquors from 8 different sources were tested. Of these, 3 represented "hard", 2 "medium", and 3 "soft cooks". One liquor of each type was fermented to lower the sugar content ; the others were not. All were purified by treatment with Na_2CO_3 and concentrated to about 60% solids. The purification raised the ash content but apparently lowered the analytically determined organic non-tannin content, so that the purity (about 50) was unchanged. Apparently some organic non-tannin was changed into material absorbed by hide powder during the alkaline treatment and evaporation. The purified ligno-sulfonates varied in methoxyl content from 4.0 to 7.2% (dry basis). The 8 materials differed very little in ratio of tannin to soluble solids, tan value (49-48), combining value (29-30), or

fraction precipitated by saturated NaCl (33-42%). None of them was a good tanning agent. Three series of syntans were prepared by condensing each of the 8 lignosulfonates with (a) phenol 2-naphthol, (b) phenol, only and (c) dihydroxydiphenyl sulfone. Tests of the products, including small-scale tanning tests, showed no differences within any one series attributable to differences in the original sulfite cellulose liquor. All were satisfactory tanning agents. The authors conclude that the method of cooking (hard, medium, or soft), and the removal of sugars by fermentation, have no effect on the tanning characteristics of lignosulfonates, alone or condensed with phenolic compounds.

REACTION OF NITROUS ACID WITH COLLAGEN. *James M. Cassel. J.A.L.C.A.* **51**, 8, 406, (1956). The reaction between nitrous acid and collagen at 16°C. was studied by determining the amino acid composition of derivatives prepared by varying the time of the reaction from five minutes to six days. One sample, after reacting with nitrous acid, was decolorised by treatment with permanganate and bisulfite. After hydrolysis the amino acid analyses of all derivatives were obtained by two-dimensional paper chromatography. Aspartic acid, glutamic acid, glycine, proline, hydroxyproline, leucine, isoleucine, valine, alanine, phynylalanine, and histidine were not attacked by nitrous acid. The — amino, guanidino, and phenolic groups of lysine, arginine, and tyrosine, respectively, were attacked, but not to the same degree. The lysine content decreased progressively to zero. In samples deaminated for periods longer than 12 hours the arginine content was reduced. The tyrosine content was decreased progressively by deamination, and both methionine and tyrosine were attacked by the decolorizing procedure.

THE CONSTITUTION OF SYNTANS. *J. Strachota. Kozarstvi*, 5, 132-36, 154-57 (1955). *Via J.A.L.C.A.* **51**, 9, 506, (1956). Fractionation of sulfonated Novolaks and determination of free H_2SO_4 are described. The constitution of I.G. Syntans given in the BIOS reports is not always correct.

The unsulfonated fraction of a syntan, SN 25, was determined by extraction from aqueous solution by ether, and amounted to 10.5% of the dry substance. The partition co-efficient for SN 25 (a condensation product of 1 mole phenol with 0.9 mole HSHO) between water and ether at 20°C is 0.033. This co-efficient is 0.21 for sulfonated Novolak. The average molecular weight of the unsulfonated part of SN 25 (determined by Rast's method) is 728 + 9; it contains therefore 6 to 7 benzene rings. Hejcl (unpublished results) has found an average molecular weight for SN 25 of 968, corresponding to 9 rings. SN 25 contains, before neutralization, 3.8 + 0.15% free H_2SO_4 (by extraction with n-butyl alcohol + ether). By dialysis the amount found was 2.2%.

THE NETWORK STRUCTURE OF ELASTIN IN THE GRAIN LAYER OF CATTLE HIDE. *Edward F. Mellon and Alfred H. Korn. J.A.L.C.A.* **51**, 9, 469, (1956). The recent isolation of a condensed layer of elastin from the grain surface of a cattle hide appeared contrary to the histological findings which indicated fine fibers distributed generally throughout the grain layer. By horizontal sectioning and chemical fractionation of the

sections the condensed layer of elastin was shown to be result of the collapse of a three-dimensional network of elastin which extends throughout the thickness of the grain layer. A maximum concentration of elastin occurs at about one-third the depth of the grain layer. Commercial trypsin was able to dissolve this elastin network from the surface layers.

THE INFLUENCE OF SALTS, PIGMENTS, AND PRESERVATIVES ON THE STABILITY OF PIGMENTED CASEIN FINISHES FOR LEATHER. *Z. Liss. Kozarstvi*, 5, 65-66 (1955). *Via J.A.L.C.A.* **51**, 9, 504, (1956). The rate of decomposition of factory-made, pigmented casein finished was measured by determining drop in viscosity on aging. The rate depends on the kind of pigment, and decreases in the order: Versal scarlet RNL, Versal yellow 5G, phthalocyanine blue, carbon black, Graftol bordeaux HB, iron oxide red. The finish containing the last-named pigment showed no decomposition in 8 months, and the binders without pigment showed none in 6 months. The decomposition may be catalyzed by the pigments or by the water-soluble salts that they contain. Water extracts of the first two pigments contained Fe, Ca, Cl, SO_4 and NO_3 ions. When small amounts of the corresponding salts were added to a 15% casein solution, partial coagulation occurred immediately, and the viscosity dropped to that of water after 21 days at 40°C. However, addition of these pigments after freeing them from soluble salts brought about decomposition in 10 to 24 days. The pigmented finishes could be preserved by using increased amounts of preservative (p-Cl-*m*-cresol), the amount required depending on the particular pigment, and being larger for dilute than for concentrated casein solution.

MOLECULAR SIZE OF PHENOL-FORMALDEHYDE RESINS USED FOR THE PRODUCTION OF SYNTANS, AND KINETICS OF THEIR FORMATION. *I. Binko and F. Hejcl. Kozarstvi*, 5, 174-77 (1955). *Via J.A.L.C.A.* **51**, 9, 505, (1956). Sulfonated novolacs are important raw materials for the manufacture of syntans, including syntans SN 25 (much used in Czechoslovakia) K_1D, and K_2D. The novolac resonates between cis-and trans-forms. The molecule is linear up to a ratio of 1 phenols to 0.9 HCHO; this is also the limiting ratio for easy sulfonation. A higher ratio of phenol to HCHO tends to give cross-linking. The authors prepared novolacs containing 1 phenol to 0.6, 0.7, 0.8 and 0.9 HCHO, condensed at 95-97°C for 10 hr. The effect of time of condensation (1.75-10 hr.) was studied in the case of the 1 : 0.8 product. The products were dried *in vacuo*, dissolved in 50% aqueous alcohol, and fractionated by stepwise addition of dilute H_2SO_4, into 3-4 fractions. The molecular weight of each fraction was determined. For the 1 : 0.9 product, the theoretical molecular weight would be 1049, and the molecule would contain 10 benzene rings, assuming uniformity of molecular size. The actual molecular weights found varied from 230 to 1135. They were highest for the first fraction precipitated from each product, increased with increasing proportion of HCHO to phenol, and with time of condensation. The maximum molecular weight found corresponds to a 12-nucleus molecule. The probability of formation of molecules with an even number of nuclei is much greater than for an odd number. Complete condensation was obtained in from 6 to 10 hr. The condensation times used in manufacturing exchange syntans is said to be too short.

THE COMPARATIVE SUSCEPTIBILITY TO COLLAGENASE AND TRYPSIN OF COLLAGEN, SOLUBLE COLLAGENS AND RENAL BASEMENT MEMBRANE. *E. Dresner and M. Schubert. J. Histochem. Cytochem*, 3, 360-68 (1955). *Via. J.A.L.C.A.* **51**, 9, 509, (1956). Collagen and reticulin are closely associated anatomically, but their staining properties vary according to the technique employed. It is believed by some workers that reticulin is converted into collagen in the tissues. Electron microscopic studies show a close morphological resemblance between collagen reconstituted from acid—or alkali-soluble collagens and the native collagen fibers. Detailed methods are given for the preparation of various substrates — solid collagen, acid-soluble and alkali-soluble reconstituted collagen, and renal reticulin. These dried preparations were analysed for moisture, nitrogen, hydroxyproline, tryrosine, hexosamine, and total sugars. Gelatin formation also was measured. Data show that the amount of acid-soluble collagen derived from foetal calfskin is 213 times greater than from pigskin, 95 times greater than from the skin of a 70-yr. old human, and 7 times greater than from catskin. The limiting factor in the foetal calfskin continued to yield a soluble product, but the residual material had become swollen, gelatinous and sticky. For the other solid collagens, extraction of acid-soluble fractions were completed after 6 days. The analytical data on the various substrates show a marked difference between the insoluble collagen and the reticulin preparation in the low hydroxyproline content and the low gelatinization of the latter. The soluble skin collagens, in general, have lower hydroxyproline and higher polysaccharide contents than the insoluble collagens. Data for the enzymatic hydrolysis using either trypsin or cloistridial collagenase show : (a) both enzymes cause digestion of all substrates ; (b) the rates of digestion of all substrates were similar for each type of enzymate ; (c) all the substrates were more readily hydrolyzed by collagenase and more resistant to trypsin, indicating that collagen is a specific substrate for collagenase ; (d) the products of enzymatic digestion were peptides, and hydroxyproline was detectable in the supernatants only after acid hydrolysis (*no free* hydroxyproline was liberated during incubation up to 6 hours) ; (e) the rate and extent of digestion of reticulin (with trypsin) was about twice that of collagen ; and (f) there is some slight hydrolysis during incubation in the absence of enzymes. The significance of these data is discussed in relation to other published work on similar proteins.

GENERAL

PURIFICATION OF TANNERY EFFLUENTS. *V. Kubelka and C. Halamek. Kozarstvi*, 5, 194-97, 215-17 (1955). *Via. J.A.L.C.A.* **51**, 8, 454, (1956). Wettings in Czechoslovakia amount to 40,000 tons of hides for vegetable, and 20,000 tons for chrome tanning annually. Tannery effluents (5 g. per 1. dry solids) amount to about 1.6 million cubic meters. In a typical tannery, 36 1. of effluent were produced per kg., salted steer hide in vegetable tanning, and 72 1. in chrome tanning. Data are given on quantities of effluent from different operations, and the purification by sedimentation of concentrated and total effluent is discussed.

PREVENTION OF RUNNING GRAIN IN CHROME LEATHER. *L. Masner, Kozarstvi*, 5, 152-3 (1955). *Via. J.A.L.C.A.* **51**, 8, 451, (1956). The cause of running grain is often too long a soak. Liming with 3-5% of Na_2S (60%) and 2-6% CaO is recommended. Sometimes addition of 3-5% NaCl is useful. When liming with a high proportion of CaO at temperatures above 15°C., the time of liming should be shortened. The flanks should not be fleshed clean. The pelts should be delimed without delay and bated as little as possible. Bating should start at pH 6-7, and the pH should not be raised to 8-9 until deliming is complete, to prevent overbating and production of loose flanks. Fuller bellies are obtained by replacing HCl by H_2SO_4 in pickling. The float during chrome tanning should not exceed 100%, and the basicity should not be over 40%. Some flesh should be left on the bellies after shaving. In fatliquoring, calf leather should receive 0.8-10% pure fate (never over 1.4?%). It is better to fatliquor less, and add the necessary neutral fat or an ammonium soap to the flesh sides of the butts before first drying.. When using sulfated oils only, the flanks are easily over-greased. Buffing of the bellies should always be done from tail to head—never from spine to belly. The bellies should be glazed only once, even if the rest of the leather gets 2 glazings. It is also possible to set the grain before chrome tanning by metaphosphates (Calgon). In the first stages of drying a high relative humidity should be maintained, followed by a rapid drying at 45-50°C.

EFFECT OF ULTRASONIC VIBRATIONS ON PROCESSES OF LEATHER TECHNOLOGY. *V. M. Fridman, A. L. Zaides, A. N. Mikhailov, N. N. Dolgopolov, and N. M. Karavaev. Doklady Akad. Nauk S.S.S.R.*, 92, 399-400 (1953). *Through C.A.* 49, 8624 (1955). *cf. C.A.* 48, 14268a. *Via. J.A.L.C.A.* **51**, 1, 34, (1956). The effect of ultrasonic vibrations on depilation and tanning was studied with an app. having a frequency of 1200 kc. and a power of 8-10 w. sq. cm. The app. was equipped with a cooling system to maintain const. temp. in the reaction vessel. After 6 hrs. at 30°, the hair and epidermis came off easily and the grain side was smooth ; hair and epidermis were not removed in this time by a lime suspension without ultrasonic vibrations. Tanning was complete after 18 hrs. at 30° with, and in 114 hrs. without ultrasonic action. The resulting leather was full, with fibrous microstructure.

HEALTH IMPAIRMENT IN PRESERVING HIDES WITH SODIUM FLUOSILICATE. *J. Kerka, F. Pokorny and F. Picha. Procovni Lekarstvi* 7, 102-4. *Through C. A.*, 49, 9310, (1955). *Via. J.A.I.C.A.* **51**, 1, 34, (1956). Cases of acute inflamation of the nasal mucous membrane and acute conjunctivitis are described in workers handling hides in salt contg. 0.1 per cent of Na_2SiF_6. The atm. contained between 0.0014 and 0.0084 mg. Na_2SiF_6 in 1 liter. Hygienic measurements and technological improvements of the manufg. process ars suggested.

CORROSION IN THE TANNERY. *F. E. Humphreys. Corrosion Technology*, 2, *No.* 6, (1955). *Via. J.A.L.C.A.* **51**, 1, 31, (1956). The atmosphere of a tannery is one of the most highly corrosive of industrial atmospheres. Humidity is high, often containing corrosive vapors from

the various liquors used in tanning processes, and the tanner has to choose his metal materials carefully. An additional hazard is the danger of harmful corrosion products dropping on to the skins and hides. This article describes metals which can be used for different tanning processes and also methods of protecting structural steelwork of the tannery. Staybrite steel (a steel containing 18/8% Cr/Ni and Mo) is recommended for practically all the various tanning processes including soak liquors, lime liquors, deliming and bating liquors, pickle liquors, vegetable tannin liquors, chrome tannin liquors and for those metal portions of wooden drums. Also staybrite steel rollers are said to impart a higher polish to leather than bronze, which develops slight pitting in use. In the use of coatings for the protection of structural steelwork, chlorinated rubber system, in general, gave poorer results than linseed oil paints. Of the paint systems tried, none gave longer life than a linseed oil based system with a red lead undercoat and an excluding top coat, a result with which other investigators agree. The composition of the primer coat is highly important. Metallic lead and calcium plumbate seemed comparable to red lead. Metallic zinc and zinc chromate were inferior to red lead, although in less corrosive atmospheres good results were obtained. The failure of zinc primers in this very corrosive atmosphere may have been due to the impossibility of obtaining a substantial area of metallic iron/zinc contact. The failure of Chlorinated rubber and synthetic systems was probably due to failure of the primer.

TANNINS IN ANILINE PRINTING. *A Angelini. Chimica (Milan)*, 12, 51, (1956). *Via J.A.L.C.A.* **51**, 8, 448, (1956). For the preparation of printing inks, tannins are added to the solution of a basic dye in an organic solvent in the proportion of 1 mole dye to about 4 moles tannin ; the tannin-dye lakes have a high coloring power and brilliancy, and are very resistant to light and rubbing. Several tests to find out what type of tannin is most suitable for this purpose show that the hydrolysable pyrogallol tannins are more useful than the catechol tannins, because the flavone and anthocyanine derivatives do not give good complexes with the dyes. The examination of the tannins was made by paper chromatography using a mixture of butanol-acetic acid-water as a solvent, and $FeCl_3$, $AgNO_3$ and diazotized sulfanylic acid as reagents for developing the spots.

GELATIN FROM "ACID-LIMED" FLESHINGS. *A Bycichin, J. Lacnak, and B. Nemec. Kozarstvi*, 5, 146-48 (1955). *Via J.A.L.C.A.* **51**, 8, 452, (1956). Flesh splits of limed steer hides and hog skins were washed 18 hr. in water at 14°C., and "limed" in 200% of a 2% solution of acetic acid at 20°C. After 6-8 days the solution, which then contained 0.8-0.9% acetic acid, was replaced by a fresh one. The splits were washed after 40 and 200 days. The gelatin leaches out slower than from normally limed stock. The physical and photographic properties of "acid-limed" gelatin are superior. The iso-electric point is pH 7, instead of pH 5 for normal gelatin. The acid gelatin is suitable for colour photography. The disadvantage of the acid process is the need for preliminary degreasing. Total processing time is about the same.

PATENTS

MANUFACTURE OF LEATHER USING A MODIFIED VINYL ETHER-MALEIC ANHYDRIDE. *U. S. Pat.* 2, 746, 837. *Joseph S. Kirk, Newtown, Pa., assignor to General Aniline & Film Corporation, a corporation of Dalaware.*—1. *Via. J.A.L.C.A.* **51**, 9, 511, (1956). A process comprising treating hides skins and leather with a lower alkyl vinyl ether-maleic anhydride copolymer in which at least about 5 and no more than 15% of the anhydride groups have been converted to the salt-half amide with a member of the group consiting of ammonia and lower aliphatic primary and secondary amines.

REGENERATING TANNING SOLUTIONS. *Brit. Pat.* 739, 312. *Aktieselskabet Toten Cellulose-Fabrik. Apl. Nov.* 5, 1953. *Via J.A.L.C.A.* **51**, 9, 511, (1956). The salt content of tanning solutions is reduced and the pH adjusted during the tanning process by conducting a portion of the solution through an acid cation exchanger and returning it to the main solution. The process may be operated continuously or discontinuously. The portion circulated through the exchanger may be heated, e.g. to 60-90°C., and a settling chamber may be provided if desired in the circulating stream. Cellulose extracts are mentioned as tanning substances.

NOTES AND NEWS

SURFACE MEASUREMENT OF pH

An instrument having a special electrode for the surface measurement of pH was shown by Clayton Dyestuffs Co. Ltd., Manchester at B. I. F. The swiss-made polymetron, this enables pH readings to be taken over the whole surface area of piece of leather after it has been wetted with a non-ionic agent. The cylindrical measurer is pressed down over the surface, causing an inner glass lining to retract and expose two lectrodes. By making a slanting cut through the leather, it is possible to take pH readings through the thickners to discover the degree of penetration obtained by different processing treatments at varying levels.

—*Lea. Tr. Rev.* **120**, 3657, 275, (1956).

INDIAN HIDES FOR POLAND

Hides and skins and myrobalan and its extracts are included in a list of commodities available for export from India to Poland under a new Trade Agreement that will operative until the end of 1959.

—*Lea. Tr. Rev.* **120**, 3658, 324 (1956).

NEW PUBLICATIONS

Industrial Research Laboratories of the United States. 10th ed., 1956. Compiled and published by the National Academy of Sciences, National Research Council, Publications Office, 2101 Constitution Ave., Washington, D.C. Contains data on 4,834 laboratories of 4,060 companies, with an index of research activities including over 1000 major subject headings. 560 pp. $ 10.

Leather Finishes. J.S. Mudd. 2nd ed., 1955 Croydon, England : A. Harvey, 15 shillings.

Production of leathers resistant to powerful oxidants and reductants. PB 111882. Washington, D.C. : Office of Technical Services, U.S. Department of Commerce. 62 pp. $ 1.75.

It would be greatly to the interest of the tanner, and would save him much annoyance, if all hides were imported in a *green* state, that is, merely salted ; for when dry, it is very difficult, even for the most experienced, to detect many defects which would impair the quality of the leather into which it is to be converted.

—*J.de Fontenelle and F. Malepeyra, The Arts of Tanning, Currying and Leather-Dressing, Philadelphia,* 1852.

A stitch in time saves nine. Judicious expenditure for chemists' services is more than likely to save 10 times the amount invested by the tanner. . .

The leading and most successful tanners have their own chemists, who are kept busy all day long, and who are often big money makers for their employers. The big tannery corporations employ at least two or more chemists, and in consequence are able to conduct their business with far less guesswork and uncertainty than tanners who believe they are above and beyond the help and production of chemists.

—*Modern American Tanning, Vol. II-Chicago : Jacobsen Publishing Co.,* 1902. *Via. J.A.L.C.A.* **51**, 9, 481, (1956).

RECIPE FOR HIDE POISON. Modern American Tanning, 1, Chicago ; Jacobsen Publishing Company, 1902. *Via. J.A.L.C.A.* **51**, 9, 479, (1956).

Poison to prevent damage by insects during the summer may be made as follows : Put 40 pounds of red or white arsenic in a kerosene barrel with one pound of concentrated lye. Fill with water and let stand for one week. Of this mixture, take two pails and pour into an oil barrel full of water. The poison is now ready for use and should be sprinkled with an ordinary sprinkling can on both sides of the hides and skins.

WATTLE TANNIN AND MIMOSA EXTRACT. Grahamstown, South Africa : Leather Industries Research Institute, 1955, 205 pp. Price : £2. ($ 5.60).

The staff of the Leather Industries Research Institute has brought up to date its older text book, " The properties and practical application of wattle tannin ". This present text is entirely new, reviewing extensively the results of the concentrated research programme on wattle tanning carried out in South Africa over the past decade.

The first section of the book contains a 31-page general, or historical, introduction. The chapter on the manufacture of black wattle bark extract is particularly interesting and informative.

THE INDIAN PAVILION AT FRANKFURT FAIR

The Indian pavilion at the Frankfurt Autumn Fair was the biggest single national pavilion at the Fair. Artistic display of brocades, silk and cotton textiles, leather goods, carpets, handicraft, coffee, tea, cashewnuts, spices and coir products aroused great interest among German and foreign importers and attracted big crowds.

—*J. Ind. & Trade,* 6, 10, 1518, (1956).

COMMONWEALTH CONFERENCE TO DISCUSS STANDARDS PROBLEMS

Final arrangements for holding the third Commonwealth Standards Conference in New Delhi from 21 January to 3 February 1957 are now well in hand. Some 125 important standards personalities and leaders of industry from Commonwealth countries will meet at the Conference for which the Indian Standards Institution will act as the host. The object of the Conference will be to secure greater alignment of industrial standards and standardization policies of Commonwealth countries in the interest of inter-commonwealth relations and trade. The success of the previous two conferences held in London in 1946 and 1951, which have helped a great deal in facilitating uniformity and bringing close relationship between the commonwealth countries for promoting flow of trade, has indicated the necessity and desirability of a third Conference.

The delegates at the Conference will represent Australia, Canada, India, New Zealand, Pakistan and the United Kingdom. The 80-man Indian Delegation will consist of representatives from the major Indian industries concerned, Government Departments and Directorate of the Indian Standards Institution. A full list of names of these delegates is attached. The economic Commission for Asia and the Far East, which is greatly interested in standardization in the ECAFE region, has also been invited to send an observer to the Conference.

The technical discussions at the Conference will be held in four separate sessions, each covering the subjects of steel, electric cables, electric equipment of machine tools and safety requirements for domestic electrical appliances.

The general questions of policy will be reviewed in separate sessions at which consideration will be given to various problems of common interest like the metric and the inch-pound systems of measurement, certification marking, modular co-ordination, standards for consumer goods, general alignment of standards, terminology, approval schemes and ABC work. The conference will also review the recommendations of the second Conference and implementation thereof. Thirty-one papers have been received to provide basis for discussions.

"OPEN HOUSE" AT THE CENTRAL LEATHER RESEARCH INSTITUTE.

Realising the economic value of the Indian leather industry and the importance of leather research, the Central Leather Research Institute has been established in 1953 to conduct research and develop the technical know-how ; to train technical personnel to disseminate the scientific knowledge in the industry ; and put the industry on a solid scientific level.

The objectives of any research organisation are : "to develop new processes, materials or products ; to improve the quality of the existing products ; to reduce the cost of processes and products ; to increase the utility of a product including the waste bye-products ; to bring about better standardisation ; to anticipate and prevent troubles in the operations ; to amass technical information leading to a better understanding

of a product or a process ; and to contribute to the common store of general technical knowledge with the ultimate objective to increase the markets for the products and so raise the sandards of living".

What has this Leather Research Institute done in this regard for the past three years since its official opening in 1953 ?

Assessing the immediate needs and demands of the Indian leather industry, the programme of research has been planned at this Institute. Some of the concrete achievements of the Central Leather Research Institute in this regard are :-

(1) Better curing agents and curing methods to improve the raw hides and skins ;

(2) Substitutes for imported wattle bark from indigenous tanning materials ;

(3) Preparation of leather auxiliaries like fat-liquor, synthetic tannins, pigment finishes and bates from indigenous materials with a view to stop their present imports ;

(4) Modified and rapid methods of bag-tanning, E. I. tanning and sole leather tanning ;

(5) Processes for the manufacture of a variety of leathers—upper leathers like box and willow, glazed kid, army retan leathers, upholstery leather, picking bands, roller skins, round belts, reptiles, fancy leathers etc. :

(6) Utilisation of leather wastes—manufacture of leather boards and fancy leathers from splits ;

(7) Fundamental research ;

(8) Training of technical personnel ;

(9) Undertaking of job works for the small scale tanners ;

(10) Publication of bulletins and pamphlets ;

(11) Dissemination of scientific knowledge ; and

(12) Demonstration of processes developed by research.

In continuation of these activities, the Institute proposes to have an "Open House" for three days in every quarter of the year for the tanners and public to visit and see for themselves the progress of work at this Institute.

The first of these series for the "Open House" at the Central Leather Research Institute will be inaugurated by Prof. M. S. Thacker, Director-General, Council of Scientific and Industrial Research at 2 p.m. on January 28, 1957.

You are cordially invited to go round the Institute and see the work being done. You can see the raw materials, processing methods, experimental and testing techniques, charts, models, finished leathers and leather products. Research workers will show you the work being done and explain to you how the work of this Institute is important to you, to the leather industry and to the country.

PRACTICAL DEMONSTRATION OF PROCESSES DEVELOPED AT THE CENTRAL LEATHER RESEARCH INSTITUTE FOR COMMERCIAL EXPLOITATION.

Leather Industry to-day is one of the major industries in India fetching about 40 crores of rupees annually. Presently a good amount of materials are exported in the raw, unfinished and half-tanned form, a variety of finished leathers, leather goods and leather auxiliaries are *in turn imported into India. The value of the industry will be doubled* if not trebled, if *finished* leathers and leather *goods and good* quality could be prepared to compete in the national and international markets. To achieve this goal, technical know-how is required. It is to provide *the industry with this technical know-how, the Central Leather* Research Institute has been established in the year 1953. The technical know-how is obtained *at this Institute by conducting research on the chemical*, physical, biological and other aspects of leather manufacture. The *laboratory researches* are further translated *in* a model tannery attached to this Institute and a number of processes have been developed for the manufacture of a variety of leather and leather auxiliaries.

Research is a word that is much used and also much abused. Contrary to the popular impressions that research is magic, research is the product *of thought*, hard-word and patience. There is a constant criticism about the industry not trusting the *research worker* and vice versa. *This* Institute firmly believes that it is not enough to conduct research. In its view, research workers who choose to confine themselves *in a monastic* environment must not complain that their researches remain unrecognised, if they prefer *to isolate* themselves from the outer world in which *their labours* are expected to *blossom and fructify. It is not enough* to conduct research but is very necessary to translate and to apply them to the practical field and to disseminate the same in the *industry*. It is with this purpose that this Institute has planned to demonstrate the processes *developed at this Institute by research to the representatives of the* tanning industry. This will give the tanner an opportunity to watch the progress of the process at each stage, to assess the quality of the material produced, to determine the economics of the process and to accept the value *of research. If* the tanner is *fully satisfied* with the *demonstrations*, he is welcome to take up these processes for commercial exploitation.

It is planned to demonstrate one process every month and each process may take about 2 to 3 weeks for completion from raw to finish. A number of processes on the manufacture of a variety of leathers and leather products are to be demonstrated, namely, (1) manufacture of army retanned upper leather, (2) manufacture of sole leather, (3) manufacture of picking bands, (4) manufacture of good quality chrome upper leathers from bad quality hides, (5) manufacture of reptile leathers, (6) manufacture of gold and silver kid leathers, (7) manufacture of fat-liquors and (8) manufacture of bates etc.

Each month, the process for demonstration would change. Information regarding the actual dates and programme of the demonstration of these processes will be intimated to you from time to time, sufficiently *in advance.*

The *first of* these series will be inaugurated on January 28th, 1957 at 2 p.m. by Prof. M. S. Thacker, *Director-General of the* Council of Scientific and Industrial Research, New Delhi.

You are *cordially invited to attend or* to send your tanner representative to visit the Central Leather Research Institute and to follow up the demonstrations from raw to finish. Any suggestions from you in regard to these demonstrations are welcome and your kind co-operation and active *participation is solicited.*

DEMONSTRATION No. 1

1. *Place :* Central Leather Research Institute, Adyar, Madras-20 (Tannery building).
2. Period : January 28, 1957 to February 20, 1957.
3. *Process :* Manufacture of chrome retanned upper leathers.

Manufacture of Chrome retan upper Leathers

Indian hides mainly from dead animals are of poor substance and bad quality *and* every tanner knows that good leather cannot be made from a bad hide. The responsibility of the leather technologists in India, is therefore, all the more great to make good *leathers from bad hides.* Leathers *meant* for army boots etc. require a minimum thickness of 2 to 2.5 m.m. This is very difficult to obtain from Indian cowhides of poor substance. Here again, research is required to obtain this additional thickness from Indian cowhides.

With the above objects, in mind, research have been conducted at this Institute and processes have been developed for the manufacture of good quality upper leathers meant for civilian and army shoes. Leathers so manufactured are presently being supplied regularly to the Footwear Service Centre at competitive prices. These leathers are going into the making of civilian chappals and shoes.

It is this process that would be demonstrated at this time.

C. L. R. I. NEWS

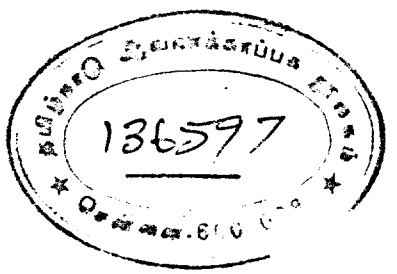
Dr. Y. Nayudamma, Assistant Director-in-charge, was present at the UNESCO Conference Exhibition on the 4th December, 1956 when the members of Parliament were taken round the Science Pavilion. The members were greatly impressed with the concrete achievements of the Central Leather Research Institute.

Dr. Y. Nayudamma who has been appointed as Hony. Special Officer for setting up a Central Arecanut Research Institute visited the Arecanut Co-operative Marketing Society at Shimoga and the Arecanut Research Station, Thirthahalli on the 8th and 9th December, 1956.

Mr. A. A. Rashid, a prominent member in the E.I. tanning industry, addressed the Leather Technologists Association on 11th December, 1956.

VISITORS

Name.		*Date of Visit.*
Dr. M. P. Panchima Dr. G. S. Koppiker	Delegates to All-India Medical Conference	20—12—1956
Czechoslovak Cultural Delegation		28—12—1956



"Registered No. M. 6720."

Editor Y. Nayudamma. Published by N. Subramanian, on behalf of the Central Leather Research Institute, Adyar, Madras-20. Printed by T. K. Venkatesan at The Jupiter Press Private Ltd., 109-C, Mount Road, Teynampet, Madras-18.

(1)	(2)	(1)	(2)