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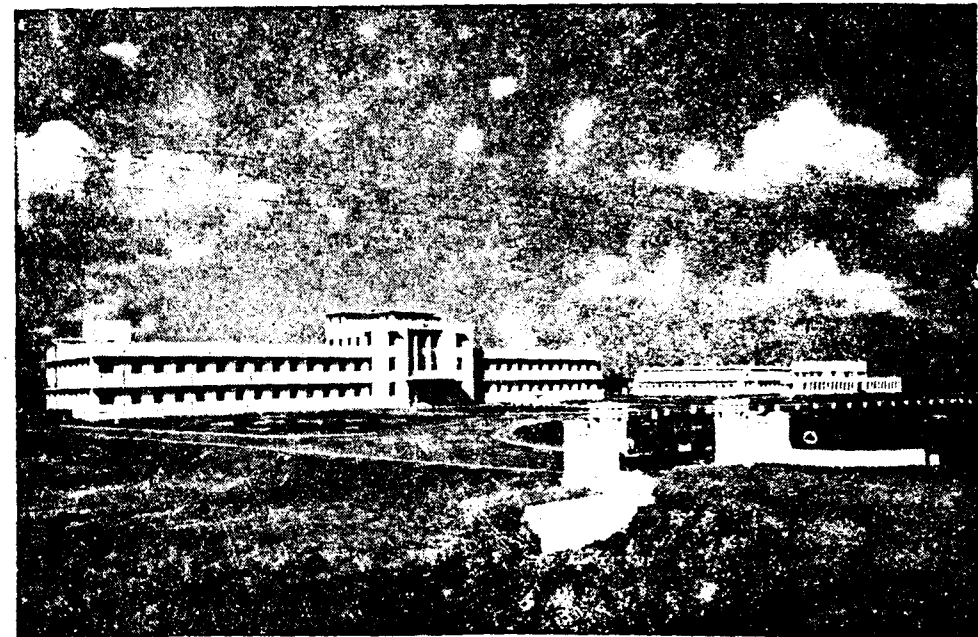


Vol. VII

MAY, 1961

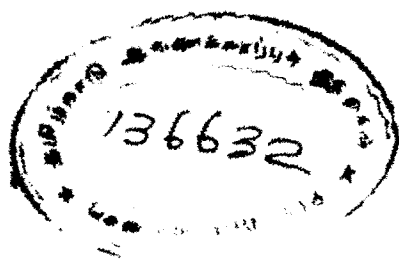
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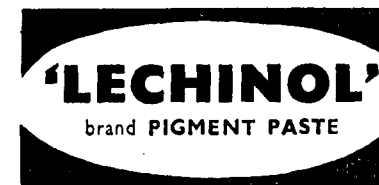
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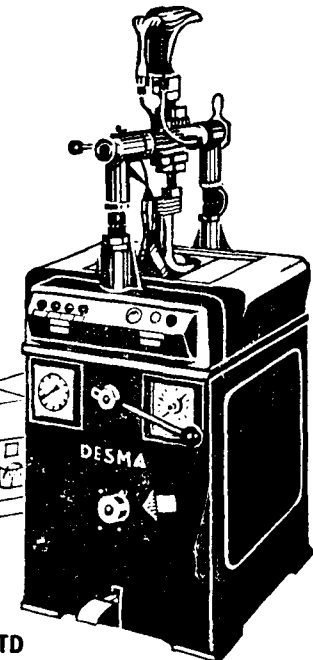
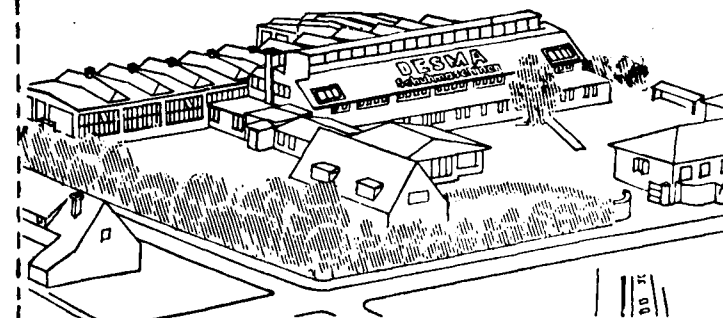
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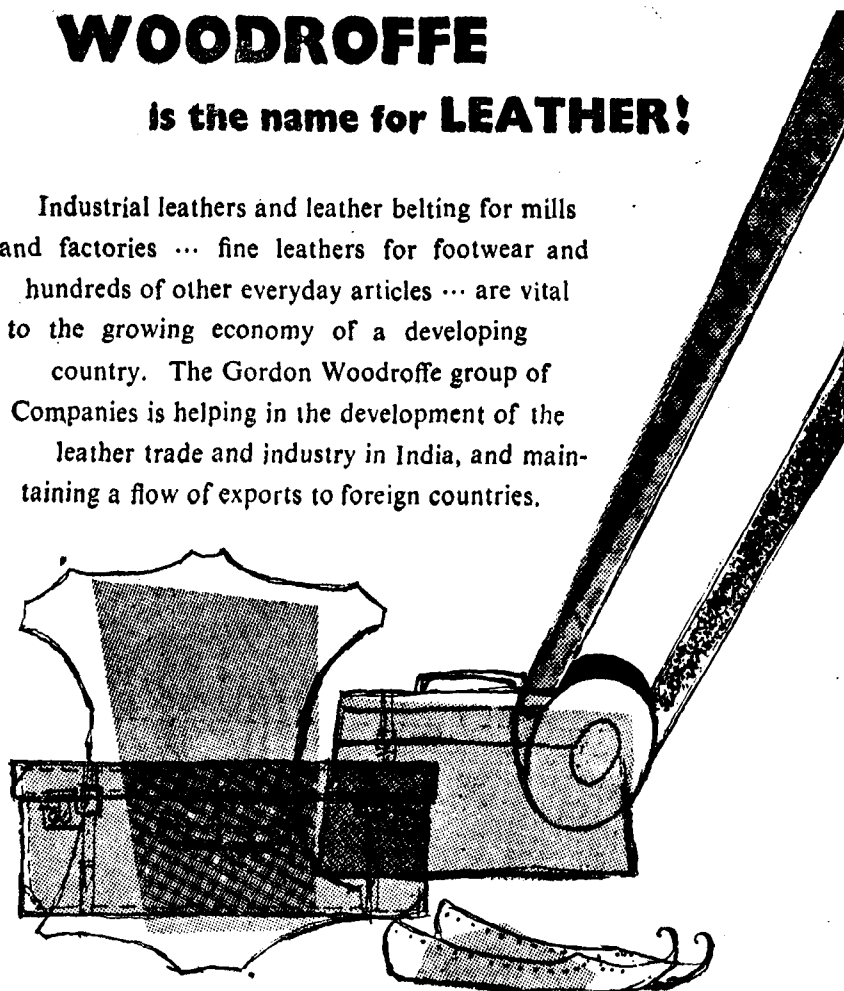


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BIOLOGICAL CHARACTERISTICS OF INDIAN HIDES AND SKINS: PART II. HYDERABAD REGION OF ANDHRA PRADESH

BY

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Received on May 25, 1960.

SUMMARY

Hide and skin specimens corresponding to different breeds, sex, age and health conditions collected from the Hyderabad region of Andhra Pradesh, have been examined histologically for the following characteristics: hair density over different locations, depth of hair or wool follicle, angle of inclination of hair or wool follicle with the surface, percentage of coarse hairs, thickness of the different locations, viz., epidermis, grain layer and corium proper, tightness of the grain, characteristics of fibre structure, gland tissue and distribution of body fat. Based on these observations, an assessment of the leather making properties of the various hides and skins has been made.

Introduction

Part I of this series¹ dealt with the biological characteristics and leather making properties of hides and skins collected from Uttar Pradesh. Similar information now obtained from the study of hides and skins collected from Hyderabad region of Andhra Pradesh forms the subject matter of the present communication.

Materials and Methods

The hide and skin specimens were collected from Hyderabad during the months of May and June, 1959. Details of the samples are given in table I. The same method of sampling and fixing, and the technique as indicated earlier¹ were followed.

Results and Discussion

Table II gives data regarding hair density and hair follicles in the various regions of the hides and skins collected. Table III

gives data about the thickness of the hide or skin and of its component layers, for all the specimens collected. Data about the natural tightness of grain are given in table IV. Table V deals with the characteristics of fibre structure and table VI with details of gland tissue and natural body fat in the specimens. The characteristics of the various breeds collected are discussed below:

Buffalo hides:

The breeds of buffaloes commonly found in Andhra Pradesh are not pure, but are mixed breeds known as "Desi". The characteristics of buffalo hides of desi type collected from Aurangabad have been studied; the salient features are described on the basis of the data in tables II-VI.

Mixed Desi (Aurangabad): This type of hide is medium sized, fairly thick at the butt area, but not heavy. While the hide from the male animal shows a more or less fairly uniform thickness over its entire area, that from the female animal is very irregular in thickness and quite thin at the belly. The hide is grey in colour and contains very little pigment; its epidermis is fairly thick and highly papillated. The hairs are numerous, the average hair density being about 1000 hairs per square inch; but the belly area in the female animal has sparse hair population (485 hairs per square inch). The hairs are mostly short or fine, the long or coarse hairs constituting on an average about 2% of the total hair population. They are not deeply rooted but inclined at a comparatively higher angle to the surface. The grain surface is very rough due to the presence of highly developed nerve papillae or projections. The grain layer, however, is fairly thick covering about 8 to 19% of corium thickness in the he-buffalo hide and 8-23% in the she-buffalo hide; a relatively thicker grain layer is noticed at the belly. While the grain merges well into the corium, the presence of a fairly large number of sweat glands is likely to weaken the junction of grain and corium. The corium proper is quite thick, but not uniform in texture. While the she-buffalo hide shows a fairly compact texture, the he-buffalo hide is rather loose specially at the neck and belly with thin fibres. The most noticeable feature of the he-buffalo hide is the high sponginess of the neck with horizontal fibres. The weave at the butt is, in general, not very high, the fibres running at an angle between 40° and 50°. Natural fat is conspicuously absent throughout. Elastic tissue is present in considerable amount only at the

TABLE I
Details of hides and skins specimens examined

Serial No.	Type of hide or skin	Place of origin	Breed	Sex and age (in years)	Nature of curing	Size	Weight (in lbs.)
1.	Buffalo	(S) Aurangabad	Mixed Desi	Female: 12	Fresh (No curing)	70" × 60"	34
2.	"	(S)	"	Male: 10	"	75" × 60"	40
3.	Cattle	(S) Karimnagar	Malvi	Female: 4-5	"	68" × 58"	25
4.	"	(S) Bijapur	"	Male: 12	"	77" × 65"	40
5.	"	(S) Ahmednagar	Red-Khandari	Female: 8	"	71" × 58"	26
6.	"	(S)	"	Male: 10	"	80" × 67"	38
7.	"	(S) Bidar	Deoni	Female: 4	"	78" × 59"	32
8.	"	(S)	"	Male: 8-10	"	76" × 60"	30
9.	"	(S) Sholapur	Khillari	Female: 10-12	"	72" × 64"	28
10.	Goat	(S) Nalgonda	Mixed Desi	Male: 1½	"	34" × 23"	2½
11.	"	(S)	"	Female: 2	"	43" × 29"	4½
12.	Sheep	(S) Mehboobnagar	"	Male: 1	"	33" × 20"	4
13.	"	(S)	"	Female: 2	"	36" × 22"	3
14.	Red-hairy sheep	(S) Warangal	"	Male: 1	"	33" × 28"	2
15.	"	(S)	"	Female: 3	"	36" × 29"	2½

S = Slaughtered.

neck and belly areas of the he-buffalo hide; a fairly large amount of reticular tissue is noticed in hides of both he- and she-buffaloes.

Cattle hides :

Unlike in Uttar Pradesh, slaughtering of cattle is not banned in Andhra Pradesh. Consequently the cattle hides collected from this region were from slaughtered animals. The hides from the following breeds of cattle, viz., (a) *Malvi* (b) *Deoni*, (c) *Khilari* and (d) *Red Khandari* have been studied (vide tables II-IV) and the salient features are as follows:

(a) *Malvi* (*Karimnagar*): *Malvi* hides are fairly thick in substance. While the cow hide is neither very spready nor uniform in thickness, the bull hide is fairly spready and more or less uniform in thickness over its area. Its epidermis is not very thick and does not contain much pigment. Hair population is not very dense, the average value being 10,400 hairs per square inch; a comparatively greater hair density is noticed at the neck and belly areas. The hairs are fairly deeply rooted but their inclination with the surface is not very high. The grain layer in the cow hide is fairly thick covering about 10 to 25% of the thickness of the corium; the value is about 10 to 15% in the bull hide; a relatively thicker grain layer is noticed at the neck and belly. The natural tightness of the grain is rather low, and much less than that of *Deoni* hides. Both the fat and sweat glands are quite big, and are likely to make the junction of grain and corium somewhat weak. The corium proper is compactly woven at the butt and front butt areas with fairly thick fibres running at an angle between 40° and 65°, but at the neck and belly the hide fibres are rather less compactly woven with thin fibres. A considerable amount of natural fat is present in the bull hide only. A large amount of elastic tissue is noticed only at the belly. A greater concentration of reticular tissue is found in the bull hide only.

(b) *Deoni* (*Bidar*): This type of hide is fairly spready and quite thick in substance but not uniform in thickness. The belly area is considerably thinner compared to other locations. Its epidermis also is not very thick but contains some pigment. Hairs in the cow hide of this type are fairly dense, the average hair population being 14,800 hairs per square inch; but in the bull, the hair density is much less, the average hair population being 9,300 hairs per square inch. Hairs are comparatively shorter and finer at the neck area than elsewhere. The hairs are fairly deeply rooted and their inclination with the surface on an average is

TABLE II
Details of hair density and hair follicles

Specimen No.	Number of hairs or wools per sq. inch.				Hair or wool follicles		
	Butt	Front butt	Back-bone	Neck	Belly	Depth (in m.m.)	Angle of inclination
1.	1105	1025	—	975	485	0.47-0.90	25°-50°
2.	1235	1037	—	1150	877	0.58-0.68	25°-55°
3.	8100	9600	—	12100	11800	0.47-1.21	30°-60°
4.	7000	8700	—	11700	14700	0.42-1.11	25°-55°
5.	8700	12900	—	17100	15400	0.53-1.43	35°-75°
6.	7800	12600	—	8700	11200	0.37-1.16	30°-70°
7.	9000	15600	—	18150	16800	0.47-1.37	40°-60°
8.	7800	9000	—	9900	10800	0.53-1.06	40°-55°
9.	8700	11700	—	22200	26400	0.42-1.16	35°-65°
10.	17561	—	13044	17149	6872	1.11-2.33	18°-55°
11.	6435	—	5680	7100	3400	1.22-1.80	22°-42°
12.	9597	—	7904	6473	4197	1.43-2.54	30°-75°
13.	9296	—	8097	6717	2816	1.32-1.75	22°-50°
14.	12578	—	13495	11275	4797	1.01-1.38	25°-72°
15.	8096	—	10495	11995	3252	1.22-1.42	23°-50°

higher than in *Malvi* hides. Like *Malvi* hides, a thicker grain layer is noticed in the cow hide covering about 12 to 26% of the corium thickness; in the bull hide, this layer covers about 10 to 20%. Maximum grain thickness is noticed at the belly. The natural tightness of the grain appears to be greater than that in any other hide in this series. Sweat glands are many but comparatively smaller in size and the junction of the grain and corium is fairly strong. The corium proper at the butt and front butt areas is well packed with fairly thick hide fibres running at an angle between 50° and 75°. This type of hide is characterised by a more or less uniform texture all over the hide, especially in the cow hide; a little looseness, however, is noticed at the neck of the bull hide. A considerable amount of natural fat is present in the cow hide. A fairly large development of both elastic and reticular tissues is noticed.

(c) *Khillari (Sholapur)*: Only the cow hide of this breed has been studied. This type of hide is fairly spready but not very thick in substance, rather thinner than all the other hides under reference. The thickness of this hide over its area varies considerably; it is thinnest at the neck. Its epidermis is not thick but contains a considerable amount of pigment. The hairs are more abundant, the average hair density being 17,250 hairs per square inch, they being very dense at the neck and belly areas. The hairs are fairly deeply rooted and are inclined at a fairly high angle with the surface. A noticeable feature is the great variation in the thickness of the grain layer over its area. The layer at the belly covers about 26% of the corium thickness, but only 7.5% at the butt. This layer as a whole is less compact in comparison to other hides and the junction of the grain and corium is somewhat weak because of the presence of a great number of epidermal appendages and well developed sweat glands. Sweat glands are many and both the fat and sweat glands are quite big in size. The natural tightness of the grain is rather low. Although the corium proper is fairly compact, the hide fibres are thin compared to other hides and at the butt they run at an angle between 50° and 70°. A little looseness is noticed at the belly. Very small amount of natural fat is present. This type of hide is characterised by a smaller development of elastic tissue, the belly area alone showing a fair development of this tissue.

(d) *Red Khandari (Ahmednagar)*: "Red Khandari" is only a local name. The bull hide of this breed is not very thick in substance but quite spready and fairly uniform in thickness. The

TABLE III
Summary of skin thickness in different locations

Specimen No.	Total thickness in m.m.					Thickness in m.m.			
	Butt	Front butt	Back-bone	Neck	Belly	Epidermis	Grain layer	Corium	
1.	5.88	4.24	—	4.66	3.92	0.06-0.08	0.37-0.90	2.96-5.37	
2.	5.67	5.03	—	*	4.34	0.05-0.07	0.44-0.82	3.47-5.17	
3.	4.55	4.97	—	4.29	3.62	0.03-0.04	0.45-0.91	2.67-4.07	
4.	4.43	4.98	—	4.92	4.61	0.03-0.05	0.47-0.71	3.86-4.38	
5.	5.40	5.05	—	4.51	3.71	0.03-0.04	0.53-0.91	2.77-4.83	
6.	3.89	3.85	—	4.02	3.79	0.03-0.06	0.45-0.84	2.92-3.38	
7.	5.45	5.72	—	4.53	3.71	0.03-0.05	0.68-1.00	2.68-4.72	
8.	4.82	4.31	—	4.50	3.97	0.04-0.05	0.47-0.81	3.12-4.24	
9.	4.50	4.28	—	3.44	3.60	0.03-0.03	0.34-0.94	2.63-4.13	
10.	4.07	—	2.71	3.34	2.01	0.04-0.05	0.79-1.48	1.19-1.97	
11.	3.53	—	3.07	3.39	2.75	0.03-0.04	0.95-1.32	1.66-2.54	
12.	3.18	—	3.71	4.90	2.91	0.04-0.04	1.85-2.54	1.29-2.32	
13.	2.91	—	2.91	2.97	2.65	0.04	1.32-1.75	1.19-1.56	
14.	2.91	—	3.44	3.44	1.80	0.04-0.05	1.01-1.96	0.75-2.01	
15.	2.49	—	2.65	2.57	2.12	0.04	1.22-1.42	0.87-1.20	

* Spongy neck could not be measured.

cow hide on the other hand, is quite thick but not uniform in thickness and is considerably thin at the belly. This type of hide is characterised by red hairs. The epidermis is not very thick but contains a fair amount of pigment. The hairs are more abundant in the cow than in the bull. The average hair population in the former is 13,500 hairs and in the latter about 10,000 hairs per square inch. As with *Deoni* breed, hairs in this breed also are shorter and finer at the neck area than at the other locations. The hairs are quite deeply rooted especially in the cow hide, and they are inclined at a very high angle contributing to the roughness of the grain surface. This roughness is more pronounced at the neck and belly, especially in the bull hide. The grain layer is fairly thick but the thickness varies widely from the butt to the belly. This layer covers in the cow and the bull hides, 9 to 21% and 11 to 21% respectively, of the corium thickness. Fat and sweat glands at the neck and belly areas are quite big in size and the junction of the grain and corium at these locations appears to be somewhat weak. The natural tightness of the grain is more or less similar to *Khillari* hide but the belly appears to be quite loose. As in *Malvi* hides, the corium proper at the butt and front butt is compact, packed with fairly thick hide-fibres running at an angle between 45° and 70° but the neck and belly are less compact showing thin fibres. Small amount of natural fat is present only in the cow hide. A fairly large development of elastic tissue is noticed at the belly area only.

Goat skins:

The only breed of goat found in pure form in Andhra Pradesh is *Osmanabad*, but as usual only the mixed "Desi" goats are rather common. The characteristics of skins from *desi* type goat have been studied (vide table II-VI) and the salient features are discussed below:

Mixed Desi (Nalgonda): Skins from both the male and female animals have been studied. This type of skin is fairly thick in substance and more or less uniform in thickness over its area. The epidermis in the he-goat skin is fairly thick and the hairs are dense. The average hair density in the male and female animals is 13,600 and 5,600 hairs per square inch respectively; but a greater percentage of coarse hairs is noticed in the she-goat constituting on an average about 37% of the total hair population. The hairs are fairly deeply rooted but not inclined at a very high angle to the surface. A higher inclination, however, is noticed only at the neck. Sweat glands are less developed but quite a

large number of them is present in the he-goat skin. Fat glands are small in size. The grain layer especially in the he-goat skin is fairly thick covering approximately 35 to 46% of the corium thickness. A relatively thicker grain layer is noticed at the neck and backbone areas. While this layer is fairly compact in the he-goat skin, it is quite loose in the she-goat. Natural tightness of the grain in the he-goat skin is fairly high and the grain surface is fairly smooth. The she-goat skin on the other hand, appears to be less smooth with coarser break of grain pattern. A noticeable feature is the comparatively less compact texture with thinner fibres at the butt and belly areas, and fairly thick fibres at the neck and backbone. While the corium proper in the he-goat skin is not very loose, it is quite loose in the she-goat skin. Very little natural fat is present. A fair development of elastic tissue is found.

TABLE IV
Natural tightness of grain

Serial No.	Butt %	Back-bone %	Neck %	Front-butt %	Belly %
3.	12.1	—	6.0	5.7	8.9
5.	8.7	—	4.7	8.2	2.6
7.	16.3	—	7.7	12.2	8.2
9.	8.0	—	4.2	7.5	3.2
10.	17.6	17.8	11.3	—	9.4
11.	11.2	10.8	9.5	—	7.3
12.	10.4	9.6	8.3	—	6.4
13.	10.2	10.0	8.7	—	5.8
14.	13.4	12.8	9.7	—	8.2
15.	11.8	10.3	8.6	—	6.7

Sheep skins:

Although the breed *Bellary* belongs to Andhra Pradesh, only the mixed breeds of sheep known as "Desi" are commonly found in this region. The characteristics of skins from both the woolly and hairy sheep of *desi* type have been studied (table II-VI) and their salient features are given below:

(a) *Mixed Desi, Woolly (Mehboobnagar)*: This type of skin is fairly thick in substance. While the skin of the female animal is fairly uniform in thickness over its area, that of the male animal shows exceptional thickness at the neck. Wools are less numer-

ous in this breed, the average wool population per square inch in the male animal being 7000; the belly area especially in the female animal is very thinly populated. Both coarse and fine wools are found in the male as well as in the female animals, a greater percentage of coarse wools is noticed in the former, about 37% of the total wool population. Quite a high concentration of coarse wool—about 71%—is found at the neck of the male animal. These are quite deeply rooted and are inclined at a rather high angle to the surface. Sweat glands are present in great numbers in this type of skin. They are not well developed in the skin of the male; fat glands on the other hand, are quite big. The grain layer covers approximately 45 to 59% of the thickness of the corium and the natural tightness of the grain is comparatively lower than that of hairy sheep (Warangal) skin. The corium proper is very loosely woven with thin fibres and the merging of the grain into corium also is poor. While natural fat is practically absent in the skin of the female animal, a very small amount is noticed at the junction of the grain and corium, in the skin of the male. A fair development of elastic tissue is also noticed.

(b) *Mixed Desi, Hairy (Warangal)*: This type of skin is not very thick in substance and the skin of the male animal is considerably thinner at the belly. The epidermis in the male skin is comparatively thicker than that in the female one. Hairs are more abundant in this breed; a greater hair density varying between 4,700 and 13,500 hairs per square inch is noticed in the female animal. A greater percentage of coarse hairs is found in the male animal constituting about 48% of the total hair population. The hairs are fairly deeply rooted but less deep than those of wool sheep (Mehboobnagar) and are inclined at a high angle with the surface especially in the male animal. As in wool sheep, a high concentration of coarse hairs (about 68%) is also found in the neck of the male animal. Quite a large number of sweat glands is present in this type of skin and they are more numerous but smaller in size in the skin of the male animal. Fat glands are rather small in size. The grain layer covers about 40 to 57% and 54 to 58% of the thickness of the corium in the he- and she-goat skins respectively. The natural tightness of the grain is comparatively higher and the merging of the grain into corium slightly better than that in wool sheep skin (Mehboobnagar). The corium proper, however, is loosely woven with thin skin-fibres. Natural fat is absent. A fair development of elastic tissue also is noticed.

TABLE V
Characteristics of fibre structure

Serial No.	Angulation of fibre weave			Packing of fibres			Elastic tissue	Reticular tissue
	Butt	Neck	Belly	Butt	Neck	Belly		
1.	45°-50°	25°-40°	< 35°	C	SL	FC	Small amount.	Large amount in neck & belly.
2.	40°-50°	< 20°	30°-35°	FC	VL	SL	Large amount in neck & belly.	
3.	45°-65°	30°-40°	30°-40°	C	FC	FC	"	Very large amount in neck.
4.	45°-65°	< 30°	35°-45°	C	L	SL	Large amount in belly.	Large amount in neck.
5.	45°-70°	35°-45°	30°-45°	C	FC	FC	Large amount in neck & belly.	Large amount in neck & belly.
6.	45°-65°	< 20°	< 30°	C	SL	SL	Large amount in belly.	Large amount in neck.
7.	65°-75°	30°-45°	30°-45°	VC	FC	FC	Large amount in front-butt and belly.	"
8.	50°-65°	< 30°	< 20°	VC	SL	FC	"	Medium amount.
9.	50°-70°	35°-40°	35°-45°	C	FC	FC	Large amount in belly.	Large amount in neck & belly.
10.	Low	Low	H	SL	FC	SL	Medium amount.	
11.	Low	H	Low	L	VL	L	"	
12.	Low	Low	H	VL	VL	VL	Large amount in neck.	
13.	H	H	H	VL	L	VL	Medium amount.	
14.	H	Low	H	L	L	L	"	
15.	H	H	H	VL	L	VL	Large amount in neck.	

H: Horizontal weave; C: Compact; VC: Very compact; FC: Fairly compact; L: Loose; SL: Slightly loose; VL: Very loose.

TABLE VI
Details of gland tissue and natural fat

Specimen No.	Number of sweat glands (Average per sq. inch)	Size of fat glands	Fat
1.	743 Fairly developed.	Medium	Practically absent
2.	843 Under developed.	"	" "
3.	6360 Well developed.	Big	Small amount.
4.	6130 Fairly developed.	"	Large amount in butt and front-butt.
5.	9100 Fairly developed.	Medium	Small amount in butt and front-butt.
6.	6200 Fairly developed.	"	Practically absent.
7.	8723 Fairly developed.	"	Considerable amount in butt and front-butt.
8.	6670 Fairly developed.	"	Small amount in butt and front butt.
9.	12150	Big	Very small amount.
10.	3617 Not well developed.	Medium	Small amount in adipose layer.
11.	2150 Not well developed.	"	" "
12.	2360 Not well developed.	Big	Very small amount at the neck and back-bone.
13.	2325 Well developed.	Small	Absent.
14.	4444 Under developed.	Medium	"
15.	3169 Fairly developed.	Small	"

Conclusions.

Buffalo hides:

Mixed Desi (Aurangabad): This type of hide is neither heavy nor greasy. It lacks uniformity both in thickness and texture and would probably produce a leather with a very rough grain surface. The less compact texture, lower angulation of hide

fibres and sponginess at the neck make this hide less suitable for firmer type of sole or heavy leather. The grain characteristics and corium thickness, however, suggest that it may be used for the manufacture of light soles for chappals. Its epidermis and hairs may not take longer time for their removal but care should be taken not to swell this hide too much, as otherwise looseness of the grain may develop because of the weakness at the junction of the grain and the corium.

Cattle hides:

(a) *Malvi (Karimnagar)*: This type of hide is fairly thick in substance and to some extent greasy and would probably produce a leather with a thick grain. The weak grain and the thin hide fibres at the neck and belly make it unsuitable for ordinary chrome upper leather. From the grain characteristics and hide texture, it appears that this hide may be suitable for chrome retan upper leather and also for E. I. tanning. In the liming process, the texture of the cow hide is likely to open up more readily than the bull hide and proper control is essential if a fairly tight grained leather is required.

(b) *Deoni (Bidar)*: This type of hide is quite thick in substance and greasy. It is fairly uniform in texture and would probably produce a leather with a fairly tight, strong and thick grain. The hide texture suggests that the cow hide of this breed may be better suited for chrome upper leather than any other type. The bull hide, on the other hand, is not likely to produce a fine break of the grain pattern. Though the belly is comparatively thinner, it is expected that this hide will produce a fairly uniform leather if the hide texture is properly opened up in the liming process, which may not open up so readily because of the greater amount of binding tissue present in this hide.

(c) *Khillari (Sholapur)*: This type of hide is not very thick in substance and not greasy and would probably produce a leather with less smooth and less tight grain surface. Its irregular grain and thin fibres make it unsuitable for ordinary chrome upper leather. From the grain characteristics and hide texture, it appears that this hide may be used for the manufacture of vegetable tanned case or upholstery leather preferably with embossed grain. While the pigmented epidermis and the hairs may require considerable time for their removal in the liming process, the hide texture is likely to open up readily. But care should be taken not to swell this hide too much as otherwise looseness of the grain

may develop. [Sholapur hides are known to produce good quality chrome side leathers. In the present investigation, as the hides collected were not of prime quality, better results have been obtained only by chrome retanning.]

(d) *Red Khandari (Ahmednagar)*: This type of hide is also fairly thick in substance and to some extent greasy. It would probably produce a leather with a less tight and less smooth grain surface. Its weak grain and thin fibres at the neck and belly suggest its unsuitability for ordinary chrome upper leather, but a combination chrome-vegetable tannage may improve the condition of the hide texture. In view of its comparatively looser grain at the belly and rough surface, artificial grain is suggested. The deeply rooted hairs and pigmented epidermis are likely to take longer time for their removal in the liming process. The belly would probably produce a very loose leather.

Goat skins :

Mixed Desi (Nalgonda): This type of skin is fairly thick in substance but not greasy and would probably produce a tight and fairly smooth grained leather. From the grain characteristics and skin texture, it appears that the he-goat skin may be suitable for the production of finer varieties of leather, but the she-goat skin is likely to produce a loose leather with coarser grain. The skin texture suggests that this skin will open up more readily in the liming process; but in view of its thinner fibres at the butt and belly, it would be necessary to plump this skin properly to obtain a fairly full butt and belly. Its deeply rooted coarse hairs may require considerable attention for their efficient removal.

Sheep skins :

(a) *Mixed Desi, Woolly (Mehboobnagar)*: This type of skin is fairly thick in substance and to some extent greasy at the neck and backbone. The wools are fairly coarse especially in the male animal. The grain layer is fairly thick but neither strong nor very smooth and the skin texture suggests that it would probably produce a rather loose leather with slightly coarse grain. While the epidermis is not very thick, the wools are quite deeply rooted and may take longer time for their removal. Special care should be taken in pulling out the deeply rooted wools at the neck during dewooling.

(b) *Mixed Desi, Hairy (Warangal)*: This type of skin is neither very thick nor greasy. Its grain layer is fairly thick and

somewhat stronger than that of the wool sheep skin (*Mehboobnagar*). From the grain characteristics and skin texture, it appears that this skin would probably produce a fairly tight-grained leather but with slightly coarse surface. The loose corium and comparatively thinner substance, however, suggest its unsuitability for the production of roller leather, but may be used for book-binding leather.

The above conclusions, however, are based on the histological characteristics of hides and skins; the actual tanning tests with some of the above hides and skins confirm these findings to a great extent. The characteristics of the final leathers are as follows :

Cattle hides :

(a) *Malvi* hide tanned by chrome process:

General appearance	— Fair, soft, pliable and plumpy.
Grain tightness	— Tight but slightly loose at the belly of the cow hide. Very tight in the bull hide.
Grain crack	— Negative to key test
Quality	— Good. Veins and growth marks are seen only in the bull hide.

(b) *Deoni* hide tanned by chrome retan process :

General appearance	— Good, soft, pliable and plumpy.
Grain tightness	— Very tight in the cow hide. Slightly loose at the belly of the bull hide.
Grain crack	— Negative to key test as well as single and double fold.
Quality	— Good. Goad marks, ticks and flay cuts are seen.

(c) *Red Khandari* hide tanned by chrome retan process :

General appearance	— Fair to good, soft, pliable and plumpy.
Grain tightness	— Very tight.
Grain crack	— Negative to key test as well as single and double fold.
Quality	— Fairly good. Ticks are seen on belly and shanks.

(d) *Khillari* hide tanned by chrome retan process :

General appearance	— Fair to good, soft, pliable and plumpy.
Grain tightness	— Tight.
Grain crack	— Negative to single and double fold.
Quality	— Good. Ticky shanks and flay cuts are seen.

(a) *Nalgonda* skin tanned by the E. I. tanning process :

General appearance — Smooth grained, full flanks, square pattern. Backbone thick near the neck only. Area of the belly portion less.

Quality — Good.

Sheep skins :

(a) *Mehboobnagar* woolly sheep skin tanned by the E. I. tanning process :

General appearance — Fairly smooth grain and fine substance, *better than Warangal hairy skin*. Thick neck. Less defects such as flay cuts, thorn marks etc. are seen.

Quality — Good.

(b) *Warangal hairy* sheep skin tanned by the E. I. tanning process :

General appearance — Fairly smooth grain and fair in substance. Belly and neck not so thick. Defects such as flay cuts etc. are seen.

Quality — Fairly good.

REFERENCE

1. Sarkar, S. K., Das, D. K., Mitra, S. K., Nayudamma, Y. and Bhaskaran, R., *Bull. Cent. Leath. Res. Inst.* 7, 249, (1961).

RESEARCH BEARS FRUIT

White chrome nubuck leather*

BY

K. RAJABATHER, N. BALAGURUNATHAN & P. S. VENKATACHALAM

Introduction

White chrome nubuck leather is characterised by a clear bright white surface with a distinctly visible chrome cut. It should lend itself to buffing both on the grain and the flesh, without getting its whiteness impaired. It is particularly important that this whiteness is achieved with minimum use of inert pigments. The process detailed below has been worked out keeping these points in view.

Details of Process

Raw material :

Wet salted or green hides of the light medium type free from grain defects (superficial scratches may be ignored) are used. 6 wet salted hides weighing 80 lb. (36.29 kg.) in all, are taken for the process. (For purposes of calculation, this has been taken as 100 lb. i.e. 45.36 kg.)

Soaking :

The goods are washed in four changes of water (500% on wet salted weight) at intervals of 30 minutes and piled to drain for ½ hour.

Painting :

A paint is prepared as follows : (The percentages given are on the wet salted weight.)

(1) 2% Na_2S (60% fused lumps) + 20% water to dissolve the sulphide.

(2) 1% hydros ($\text{Na}_2\text{S}_2\text{O}_4$) + 20% water to dissolve the hydrosulphite.

* Process demonstrated at the Institute, in January 1961.

(1) and (2) are first mixed and to the mixture is added 24% lime paste (12% slaked lime powder). The paste is applied to both flesh and grain and the hides are kept folded along the backbone, flesh out. A pile is thus built up and kept overnight.

Note: The use of 'hydros' in the paint helps to produce a whiter pelt.

Liming:

Next morning, the hides are thrown into a pit containing 400% water and 3% lime paste (1½% slaked lime powder). After handling them once, the hides are taken out in the evening, un-haired, washed, fleshed in the machine and weighed (pelt weight: 72 lb. i.e. 32.66 kg.). The goods are now entered into a bath consisting of 400% water and 3% lime paste, and left there overnight and for the whole of the next day as well. Care is taken to see that the hides are handled at least once every day. On the fourth day, they are moved into a pit of fresh water to which a handful or two of lime has been previously added. (This is done to nullify the harmful effects of temporary hardness in the water, if any.) After 3 hours, the hides are taken out, cut into sides and split to thickness of 2.00 mm. The split sides are weighed (55 lb. i.e. 24.95 kg.) and left overnight in plain water. (All succeeding formulations upto tanning are based on this weight.)

Next day (5th day), the sides are washed, scudded and delimed in a drum with ½% ammonium sulphate and 200% water for ½ hour, after which period ¼% formic acid diluted suitably with water is added to the drum, which is then run for 15 more minutes. At this stage, the sides are checked for degree of deliming with phenolphthalein indicator. They should be delimed half way through. The drum is now drained and 200% water at 40°C and ½% C.L.R.I. Bate No. 2 are put in. The pelts are bated for ½ hour. The goods are next scudded, washed and bleached in the same drum.

Bleaching:

The following materials are used:

75% water

5% common salt

¼% potassium permanganate

The pelts are drummed in this bath for ½ hour followed by a rinse in plain water. They are next worked in a reducing bath

consisting of 75% water and 2% sodium bisulphite for ½ hour. The sides are now ready for pickling.

Pickling:

The following materials are used:

100% water

10% salt

2% formic acid

The goods are drummed for 1 hour after which period, they are left lying in the same bath overnight and the next day also, after running the drum for 5 minutes in the morning.

Note: The bleaching and the organic acid pickling are done with the object of obtaining a bright white pelt.

Pretanning:

The following materials are used:

75% water

3% salt

3% Tanigan supra LH powder (Farben Fabriken Bayer)

Next day (7th day), the sides are run in this bath for 1½ hours. To the same bath, 2% chrome extract excess (B & C Co.) dissolved in a minimum quantity of water is added and after 1 hour of drumming, 2% C.L.R.I. basic aluminium sulphate (solid, 50% basic) is added. After drumming for a further period of 1½ hours, the sides are left overnight in the drum. Alternatively 3% potash alum may also be used in place of basic aluminium sulphate. Next day, the drum is run for 5 minutes and drained. The sides are kept horsed for one or two days. They are then shaved to 1.20 mm. thickness, weighed (40 lb. i.e. 18.14 kg.), washed and neutralised. (This weight is taken into account for all subsequent operations.) The washing is done for 15 minutes using 500% of plain water in the drum.

Neutralisation:

The following materials are used:

200% water

8% hypo

4% 'hypo' is added initially, the balance being added after ½ hour. After running the drum for a further period of ½ hour, the goods are washed in three changes of water, allowing 10 minutes for each wash.

'Bleach' retanning:

This is carried out with:

100% water

6% Tanigan supra LH powder (Farben Fabriken Bayer)

¼% oxalic acid, after 1 hour.

The drum is run for a further period of ½ hour. The sides are then removed and kept piled grain to grain overnight.

Fatliquoring:

Two alternatives are available.

- | | |
|--|--------------------------|
| 100% water @ 50°C | } Drum for
45 minutes |
| A. 2% sulphated vegetable oil based
on cocoanut | |
| ½% raw cocoanut oil | |
| 100% water @ 45°C | } Drum for
45 minutes |
| B. 3% C.L.R.I. cationic fatliquor | |

Either 'A' or 'B' may be followed for the fatliquoring of the sides. (Note: 'A' will yield mellow leather with little or no firmness. 'B' gives a leather with greater temper and a brighter surface whiteness).

The sides are then smeared on the grain and flesh with a paste obtained by mixing 2% China clay and 2% titanium dioxide and sufficient water for consistency. They are then dry-drummed for one hour and horsed overnight.

Next day, they are struck out and set by machine and hand and hooked to dry.

When dry, they are kept in the 'crust' condition for 2 or 3 days and then conditioned for moisture as follows: ½% solution of glycerin is sprayed on both the flesh and grain of the sides which are then rolled in and kept bundled overnight. They are machine staked the next day and toggled. When dry, they are removed from the frames, trimmed and buffed both on the flesh and grain with 240 grit paper followed by 400 grit paper on the grain. (If the substance is not uniform, a dry-shaving may also be done before buffing). They are now dusted and assorted (Area Yield: 96 sq. ft.).

Note: If it is desired to pigment the sides, a mixture of China clay and zinc oxide (2:1) or any other suitable combination may be worked into the sides before and after the buffing.

TECHNICAL SEMINAR

The Leather Industry in the Democratic German Republic*

BY

H. WACHTLER

Immediately after the end of the Second World War in Germany and on the basis of the Potsdam Agreement, a beginning was made in this part of Germany in building up normal economy.

In the course of this process of development, most of the important leather works were nationalised. A number of additional firms was acquired by the Government through purchase. Thus, today, 19 of the most important tanneries have been taken up by the Government. They produce about 87% of the total leather production of the German Democratic Republic. The advising and control of these works, effected through the Association of People's Own Works (VVB) with its head-quarters in Leipzig. Besides these Government works, there are about 35 more private works. More than half of the owners of these private works have in recent years, consented to Government participation.

The systematic development of the economy of the German Democratic Republic is seen in the leather industry also. The annual increase in the production of tanneries amounts to 6-8%. The consumption of raw hides and skins in the State owned works alone amounted in 1960, to 64000 tonnes, 32% of which were imported. From these raw materials, 11900 tonnes of hard leather (9000 tonnes of which constituted sole leather for shoe production) and 8,730,000 sq.m. soft leather (of which 4,760,000 sq.m. were shoe upper leather) were manufactured in 1960. Also the production of glove and garment leathers assumed an important place in meeting the continuously increasing demand of the population.

The continuous upward development of production in the leather industry will be systematically kept up in the following years. Therefore, the leather industry of the German Democratic Republic represents an interesting business partner for all countries exporting raw hides and skins and tanned leather.

* Based on the talk given on March 24, 1961.

It has been fixed as the target for 1961, to produce 1.72 pair leather shoes per head of population, i.e., a total of 29.5 million pairs. Apart from this, about 1 more pair of shoes will be manufactured from substitute materials like PVC-artificial leather and textiles. Thus, the German Democratic Republic assumes a notable position vis-a-vis the leather and shoe production of the highly developed countries.

The rapid development of production of leather and shoes in the German Democratic Republic was possible because (1) the most important works are in the hands of the people and thus no antagonistic tendencies can check the development, (2) the works function according to a single plan and (3) a consequent specialisation of the works has been carried out, since there does not exist any more competition of the works amongst themselves.

The Government works receive from the VVB, an annual plan. This plan embraces the following most important characteristics: Production plan according to quantity (tonne or sq. m.); production of goods in value; works productivity per production worker; lowering of working costs in per cent; gain in DM; accumulation in DM; planning new techniques (deciding which technical innovations will be introduced); investments for enlarging and maintaining the basic capital; number of workers; wage funds and average development of the wage level (so as to bring in line the purchasing capacity of the population and the available goods); duration of production; yields.

If the plan figures of a factory are achieved and exceeded, the workers and the officials get premia which vary according to performance. Thus there is a material interest for all those engaged in the functioning of a factory, to fulfil the plan targets in the best possible and favourable manner.

In the knowledge that a strict specialisation of production leads to a high works productivity and a high quality production, a systematic beginning was made even in 1954, in specialisation in the leather industry. It is today almost complete. The present position of specialisation, with regard to the available space and equipment, shows the following results:

2	factories produce only box calf,
2	" " side leather,
1	" " side leather and sole leather,
1	" " sole leather and Russian leather,
4	" " pigskin leather (shoe upper leather, fancy and lining leathers),

3	factories produce only goat and sheep skin leathers,
3	" " industrial and harness leathers,
1	" " clothing leather sides.

Every factory has, besides the above mentioned main production, a small side production like lining leather or apron leather, so that in case the raw material is not completely suitable for the main production, a suitable utilisation of the same, from the point of view of economy, could be achieved. In the course of the year, the extent of side production has been fixed through practical experience. This specialisation has brought to the country's economy great advantages through increasing the works productivity and through improvement of quality.

The continuously growing requirements of the population and the continuous rise in the living standard also require a progressive improvement of the quality of the products. The Government has made provision for this development through enacting laws. In every factory, a technical control organisation (TKO) is active. The members of this TKO are the state quality controllers who have to check the observance of the quality standards. For every 10 tonnes of hard leather and for every 10,000 sq. m. of soft leather, a leather sample is to be analysed. The analysis is to be covered with a quality certificate. The works management is fully responsible for maintaining the quality standards. If the required quality is not obtained, the leathers must be sold with considerable reduction in price, by which the material fulfilment of the plan in question is regulated. Likewise, the premia paid also drop in general. For lowering the production costs, for increasing the works productivity and for improving the quality, the VVB, the Freiberg Leather Institute and the factories have worked out in close co-operation, technological standards for the most important types of leathers. The technological workers have to be brought up in the following periods to the rational technological standards. Moreover, these technological standards serve as basis for the comprehensive reconstruction of the most important leather works till 1965. For the end of the Seven Year Plan (1965), it has set as the target to increase the productivity of a production worker to 40 tonnes of sole leather or 5100 sq. m. of box per year. This rise in productivity will be reached essentially through reconstruction of the works and introduction of production lines, for which the Government has kept ready on a large scale the pecuniary means.

TECHNICAL SEMINAR
The Freiberg Leather Institute*

BY
G. REICH

The German Tanning School was established in Freiberg in 1889; in 1897, the German Testing Laboratory also was established at the same place. Both the institutes were combined in 1938 as the Freiberg Leather Institute. Its main tasks till the end of the Second World War were training technicians, carrying out an extensive control of leather quality as well as solving technical problems in tanning. By the partitioning of Germany after the war, projects of pure fundamental research and of development of the chemical auxiliaries for the leather industry had to be taken up additionally in the programme of work of the institute. Besides, after the nationalisation of the greatest part of the leather industry of the present German Democratic Republic, the direct technical advising of works was essentially augmented by the Institute. These additional duties were managed by an expansion of the Institute in area and in personnel in the year 1955-57.

As the technical and scientific centre of the leather industry of the German Democratic Republic, the Freiberg Leather Institute actually has the various departments mentioned below.

The research section has about 15 graduates in chemistry, 5 tannery engineers and 25 technical and laboratory assistants. It chiefly caters to fundamental research in all fields of leather chemistry.

A modern experimental tannery is at the disposal of the development section with 5 tannery engineers and 10 tanners, laboratory assistants etc. It works out all technical problems and looks after tendering advice to the works.

The mechanisation and economics section is in the planning stage and will be staffed with two each of economists and machine engineers.

* Based on the talk given on March 24, 1961.

A documentation section takes care of a continuous evaluation of the international literature and publishes for the leather industry a monthly information service with short abstracts. It is staffed with one tannery engineer, 2 interpreters and one typist.

The materials testing section carries out a continuous quality control of the leather industry, advises the testing laboratories of the individual works and works out the problems of standardisation of the testing methods, quality requirements and technological processes. It consists of a chemist, a tannery engineer and about 10 laboratory assistants.

The tanners' school section trains leather technicians and chemical technologists in 2 years courses and tannery engineers in 3 years courses. With the exception of the chief of this section, all the teaching staff are part-time workers and are members in the research and development sections. The average students' strength amounts to about 40.

The pilot tannery section is, as per its design, a medium production factory with 100 employees and with an annual intake of about 300 tonnes (green weight) of raw materials. All newly developed processes are subjected here to a large scale test before being introduced in the industry. Moreover, it serves for the practical training of the students of the tanners' school. The pilot tannery covers its costs completely through the proceeds of the leathers produced so that it does not need contributions of any kind.

Together with the 20 administrative staff, the Institute has about 200 employees.

Of the current 15 main research and development projects of the Institute, the following are the most important specially among the technical problems: the cutting down of duration of tanning in the manufacture of sole leather, either by drum tanning (dynamic principle) or by pit tanning (static principle); the manufacture of high standard upper leather from extra heavy raw materials; the development of polymer emulsions for pigment finishes and the development of better syntans. The research projects, e.g., the comparative biochemical studies on pigskin, manufacture of gelatin by the acid degradation process, the determination of the correlation between constitution and tanning action, in the case of syntans, the behaviour in solution of vegetable tannins and the improvement of the physical testing methods for leather, are in the direction of fundamental research. All the results of researches are disseminated through publications, lec-

tures and practical demonstrations. A research project is, in general, considered to be complete only when it has been adopted by the industry.

In the field of syntans, it has been possible to prepare a large number of syntan components with definite constitution, by the application, on the one hand, of modern methods of separation like column chromatography on polyamide powder, counter current distribution and fractional precipitation with aromatic amines, and on the other hand, through planned synthesis. The interaction of methylol compounds of phenols with other phenols, aromatic sulphonic acids and the like has proved itself the principle of synthesis, the application of which has made possible the preparation of manifold syntan components. The extensive examination of these in tanning experiments along with the fact that any sulphonic acid group content in the syntan molecule is disadvantageous has led to the development of a condensation product, which is being actually tested; this product, which is completely free from sulphonic acid group is however taken up well, on application in a drum, in spite of its insolubility in water. It is extra-ordinarily cheap in preparation on account of the use of waste products (diphenic acid).



Dr. G. Reich of the Freiberg Institute and Mr. H. Wächtler of the VVB, who visited C.L.R.I. (vide, p. 503)

CLASSIFIED ABSTRACTS

PROCESSES PRIOR TO TANNING

Investigations on bating: Part VII—Some microscopical observations.

M. Dempsey and G. H. Green, *J. Soc. Leather Trades' Chemists* 45, 92 (1961). The fibre structure of goat skin has been examined microscopically after unhairing by sweating or by proteolytic enzymes, and also after subsequent liming and bating. Other skins were examined after lime-sulphide unhairing and subsequent bating and reliming. All the skins were taken to the chrome crust: they were examined after pickling, in the blue, after fat-liquoring, and after air-drying or acetone-dehydration.

The differences in fibre structure that were observed in the pretanning stages in the various series were maintained in the later stages, including acetone-dehydration but not air-drying. Air-drying accentuated differences by allowing resticking after each of the treatments investigated, except bating but including reliming.

Liming caused splitting up of the fibres, which was taken further by bating: reliming reduced the amount of splitting up seen in the air-dried crust leather. Both sweating and enzyme unhairing resulted in opening up, sweating to the lesser extent. Liming decreased the splitting up seen in the air-dried crust from the enzyme unhaired skin, but it increased, if anything, the splitting up in that from the sweated skin.

Elastase activity of some enzymes as related to their depilatory action.

T. C. Cordon, A. L. Everett, H. Jones, W. Windus, and J. Naghski (Eastern Regional Research Laboratory, Philadelphia 18, Pennsylvania), *J. Am. Leather Chemists Assoc.* 56, 68 (1961). The elastase activity of some 15 enzyme preparations has been determined by three methods: formol titration, histological, and gravimetric. Results obtained with the three methods did not rate the enzyme preparations in the same order, nor is there any correlation of hair loosening with the elastase activity. A preparation of keratinase from *Streptomyces fradiae* exhibited the most potent elastase activity of any of the enzyme preparations tested.

CHROME TANNING

Neutral salt-free basic chromium salts and the use of anion exchangers for their preparation.

K. H. Gustavson, *J. Soc. Leather Trades' Chemists* 45, 9 (1961). Solutions of basic chromium salts, free from neutral salts, are prepared by gradual addition of a hydroxyl-charged anion-exchanging resin of the quaternary base type to chromium chloride, perchlorate or sulphate solutions. The amount of resin is adjusted so that the hydroxyl ions released from the resin equal, or slightly exceed, the hydroxyl groups required to attain the desired basicity of the chromium compound. Such basic salts of acidities exceeding 60 per cent are conveniently prepared by this method. The preparation of extremely basic chlorides and perchlorates of chromium, with acidities in the range from 25 to 35 per cent, is also feasible under favourable conditions without any appreciable loss of chromium. Weakly basic anion exchangers are generally less suitable for this purpose than the strongly basic ones.

Studies in the masking action of substituted acetic acids.

M. J. Ellis and R. L. Sykes, *J. Soc. Leather Trades' Chemists* 45, 55 (1961). The masking action of acetic acid has been compared with that of chloro, amino and hydroxy acetic acids. Measurements of chromium fixation and increase in hydrothermal stability have been compared with data obtained from titration curves and spectrophotometric investigations. There appears to be a close correlation between the light absorption characteristics of the solutions and their ability to tan collagen.

OTHER TANNAGES

Developments in combination tannages. Part II—Some factors which influence the storage stability under normal conditions.

R. L. Sykes and D. A. Williams-Wynn, *J. Soc. Leather Trades' Chemists* 45, 16 (1961). The deterioration of chrome leather retanned with various agents has been studied under normal storage conditions (21°C, 65% R.H.). The loss of strength of the leathers is associated with an increase in the acidity of the leather. This indicates that strong acid is liberated from the chromium complex in the leather by the retanning materials employed, the more vegetable tanning material used, the greater the rate of deterioration. This effect is not peculiar to wattle extract, but is common to a wide variety of vegetable tanning materials.

Replacement of sulphate by weak acids during chrome tannage reduces the amount of acid liberated on ageing and produces leather with enhanced durability; the relative effects of the masking agents being dependent on the types and amounts used.

Blends of syntans with wattle extract give leathers with improved physical properties and enhance durability, but the efficacy of the syntans depends on the type, and pH of application.

The effects of organic acids on the fixation of chromium and zirconium by chemically modified collagen.

R. L. Sykes and D. A. Williams-Wynn, *J. Soc. Leather Trades' Chemists*, 45, 83 (1961). A study has been made of the effect of inactivating certain polar side chains in collagen on the fixation of chromium and zirconium in the presence of organic acid masking agents. Inactivation of the carboxyl groups markedly reduced the fixation of chromium and the ΔT_g of chrome tanned pelt, whereas this treatment resulted in an increased fixation of zirconium, but no corresponding increase in ΔT_g . The introduction of additional carboxyl groups had the expected effect of increasing chromium fixation, but greatly reduced the uptake of zirconium. Acetylation caused a large decrease in the fixation of both chromium and zirconium, but the shrinkage temperature in the case of the chromium tanned pelt is not affected, whereas the ΔT_g is reduced to some extent in the case of zirconium tannage.

The extent to which different anions influence chromium fixation and tanning action can be explained in terms of their relative complex-forming tendencies. While the effect of organic acids on zirconium appears to be similar, it is not at all certain that a co-ordination reaction is involved. The observed effects, viz., the reduction in fixation and ΔT_g , may be a reflection of the relative particle sizes of the complexes.

The chloride tanning salts of both metals studied have been shown to have less affinity than the sulphate salts for hide protein, and yield less stable leather. This is thought to be due to the greater stability of the metal-to-metal bridge in the presence of sulphate.

It is concluded that the mechanism of zirconium tannage is quite different from that of chromium tannage. Whereas chromium tanning is considered to be effected by the formation of a co

ordination bond between the chromium complex and charged carboxyl groups on the protein side chains, zirconium fixation may take place through multipoint attachment of large polynuclear metallic complexes by residual valency forces.

PROCESS AFTER TANNING

Production of patent leathers finished with polyurethane lacquers.

Dr. Speicher, *J. Soc. Leather Trades' Chemists* 45, 104 (1961). In the field of paint and leather finishes reaction lacquers based on polyurethanes are gaining ground over the usual linseed oil lacquers. Patent leathers finished with polyurethane lacquers show considerably improved fastness properties. The application is simple, time saving and of good reproducibility. The new processes make possible, in addition to classical black finishes, the production of white and coloured patent leathers, thus opening up new possibilities in the field of mode shades.

A survey of the chemical mechanism on which these two-component polyurethane reaction lacquers are based, is given. Properties and applications are discussed; examples of the most important properties are given.

TESTING

Refractive index measurement as a simple method of works control in the tannery.

J. H. Sharpouse, *J. Soc. Leather Trades' Chemists* 44, 542 (1960). The strength of solutions can be estimated quickly by measurement of refractive index, e.g. with a pocket refractometer. The limitations are roughly the same as those of specific gravity (Barkometer) measurements. A big advantage is that only one drop of liquor is required and this makes the method suitable for rapid determination of the concentration of solutes in a skin exudate (e.g. checking salt concentration in salted or pickled skin), of vegetable tan in rapid tannage liquors, of depilating paints, etc.

The design of a method for testing the fastness of coloured leathers to water spotting.

F. Jamieson, *J. Soc. Leather Trades' Chemists* 45, 51 (1961). The adaptation to leather of the existing test for textiles is described together with the experimental results obtained.

The determination of the sulphur content of tanning materials and leather.

A. Vos, *J. Soc. Leather Trades' Chemists* 45, 62 (1961). A critical review is given of the various methods which are available for the determination of the sulphur content of tanning materials and leather as barium sulphate.

Preliminary studies of the dynamic mechanical properties of leather.

Lee P. Witnauer and William E. Palm (Eastern Regional Research Laboratory, Philadelphia 18, Pennsylvania), *J. Am. Leather Chemists Assoc.* 56, 58 (1961). A forced-vibration resonance method was employed for the first time in studying the dynamic mechanical properties of leather. The response of the free end of a reed-shaped leather specimen that was excited by a sinusoidal displacement at the clamped end was determined. Unsymmetrical resonance curves were obtained, indicating a nonlinearity in dynamic mechanical behaviour. It is proposed that this nonlinearity was produced by the fibrous network structure of the leather.

THEORIES

The biosynthesis of plant glycosides. I. Monoglucosides.

Tsutomu Yamaha and Carlos E. Cardini (Instituto de Investigaciones Bioquimicas and Facultad de Ciencias Exactas y Naturales, Obligado 2490 Buenos Aires, Argentina) *Arch. Biochem. Biophys.* 86, 127 (1960). An enzyme from wheat germ which catalyzes the formation of glucosides from phenols and uridine-diphosphate glucose has been partially purified. With hydroquinone as substrate, arbutin was found to be formed as follows: $\text{UDPG} + \text{hydroquinone} \rightarrow \text{UDP} + \text{arbutin}$. Arbutin was identified by paper chromatography in several solvents either directly or after hydrolysis with acid or β -glucosidase. The rate of reaction with different phenols decreased in the order: hydroquinone > hydroxyhydroquinone > methoxyhydroquinone > resorcinol > pyrogallol > pyrocatechol.

The biosynthesis of plant glycosides. II. Gentiobiosides.

Tsutomu Yamaha and Carlos E. Cardini (Instituto de Investigaciones Bioquimicas and Facultad de Ciencias Exactas y Naturales, Obligado 2490, Buenos Aires, Argentina) *Arch. Biochem. Biophys.* 86, 133 (1960). An enzyme from wheat germ which catalyzes the reaction: $\text{UDPG} + \text{phenol } \beta\text{-glucoside} \rightarrow \text{UDP} + \text{phenol}$

β -gentiobioside has been purified and separated from the enzyme which leads to the formation of glucosides. The enzyme was found to be specific for phenol β -glucosides and substituted phenol β -glucosides (such as arbutin, salicin, *p*- and *m*-methoxyphenol glucoside, resorcinol glucoside, and mandelonitrile glucoside). Free sugars, disaccharides, or polysaccharides were not used as substrates.

The estimation of basic groups in wool by dye-uptake measurements.

J. A. MacLaren (The Div. of Protein Chem., Wool Res. Labs. C.S.I.R.O., Parkville, N. 2 (Melbourne), Victoria, Australia) *Arch. Biochem. Biophys.* **86**, 175 (1960). The rate of uptake of acidic dyes (acid form) by wool from aqueous solution is markedly increased by the presence of hydrogen-bond-breaking reagents. Wool absorbs Orange II very rapidly from solutions in anhydrous formic acid. At solution concentrations above 3 meq./l., the uptake is constant at 0.83 meq./g. Merino 64's wool which corresponds to 1 equiv. of dye per basic group. The technique is applicable also for the estimation of basic groups in chemically modified wools.

The water-soluble proteins of bovine skeletal muscle.

M. J. Kronman, L. E. Weinberger and R. J. Winterbottom (The Eastern Reg. Res. Lab., Philadelphia, Pennsylvania) *Arch. Biochem. Biophys.* **86** 238 (1960). The myogen fraction of eight different muscles of four bovine animals was studied. Of the muscles considered, three were clearly differentiable from the others on the basis of water-soluble protein and aldolase content and "ultimate" pH. The relationship between "ultimate" pH and soluble protein, muscle buffering capacity, and inherent anaerobic glycolytic rate was discussed. Electro-phoretic patterns of aqueous extracts of bovine muscle were found to be comparable to those reported previously for rabbit muscle. Considerable variation in relative amounts of components was observed from muscle to muscle and from animal to animal, without any apparent regularity. Ultracentrifuge patterns of these same extracts were qualitatively similar, i.e., the soluble proteins fell into one of three groups: 2.3 S, 4.7 S, and 6.8 S. No systematic variation in relative amounts of components was observed. Extracts of *longissimus dorsi* were fractionated by ammonium sulfate precipitation and the fractions further characterized. Tentative identification of myogen fraction components was made by comparison of solubilities, electrophoretic mobilities, and sedimentation constants for

rabbit muscle proteins with those observed for bovine muscle extracts and fractions.

Enzymic activation of peptide.

Syozo Tuboi and Akio Huzino (The Depart. of Biochem., School of Medicine Nagoya Univ., Nagoya, Japan) *Arch. Biochem. Biophys.* **86**, 309 (1960). Hydroxamates of peptides were formed from some peptides by incubating with pH5 enzyme, hydroxylamine and ATP. L-Leucyl-L-tyrosyl-hydroxamate was identified by paper chromatography. The formation of glycyl-L-leucyl-hydroxamate was dependent on ATP. ATP was formed from the synthesized glycyl-L-leucyl-adenylate and pyrophosphate by incubating with the same enzyme. These results show that some peptides could be activated enzymically.

Metabolic inhomogeneity of rat tail tendon collagen: The distribution of C¹⁴ in the chromatographic components

Hyman Rosen, Alexander Kessler and Stanley M. Levenson (The Dept. of Surgical Metabolism and Physiology, Div. of Surgery, Walter Reed Army Inst. of Res., Walter Reed Army Medical Centre, Washington, D.C.) *Arch. Biochem. Biophys.* **90**, 167 (1960). Rats were injected subcutaneously with methyl-labelled glycine-C¹⁴, their tail tendons were removed at various times upto 42 days after the injections, and the collagen was solubilized in 0.1M acetic acid. These solutions were chromatographed on carboxymethylcellulose at 40°C; four components were identified and measured in the eluate by protein analysis and by liquid scintillation counting. All fractions attained maximum specific activity 12 hr. after injection. The first two fractions ("forepeak" and peak 1) attained significantly higher specific activities than the other two fractions, and the radioactivities of the forepeak and peak 1 also declined more rapidly. This indicates nonhomogeneous distribution of the label, and presumably different metabolic processes of these collagen components.

Action of trypsin on synthetic substrates. II. Hydrolysis of amide and methyl ester derivatives of some aminoacyl-L-lysines.

Nobuo Izumiya, Takeshi Yamashita, Hakaru Uchio and Kei Kitagawa (Lab. of Biochem., Faculty of Sci., Kyushu Univ. Fukuoka, Japan) *Arch. Biochem. Biophys.* **90**, 170 (1960). Several aminoacyl-L-lysine amides, wherein the aminoacyl groups are a glycyl, L-alanyl, L- α -aminobutyryl, L-norleucyl, β -alanyl, L-valyl, L-leucyl, and L-phenyl-alanyl residue, have been synthesized and

their susceptibility to hydrolytic action of trypsin demonstrated. By a comparison of the proteolytic coefficients, it could be shown that the relative rate at which each of the substrates is hydrolyzed is influenced, at least in part, by the nature of the side chain of the N-terminal amino acid residue of the substrate. The methyl ester derivatives of glycyl-, L- α -amino-butyryl-, L-nor-leucyl-, L-valyl-, L-leucyl, and L-phenylalanyl-L-lysine were also synthesized and the relative rates of their disappearance determined both in the presence and in the absence of trypsin.

Bacterial elastase. I. Isolation, purification and properties.

Ines Mandl and Betty B. Cohen (Dept. of Biochem., Columbia Univ., College of Physicians and Surgeons, New York) *Arch. Biochem. Biophys.* **91**, 47 (1960). A bacterial elastase has been isolated from a flavobacterium species and freed from contaminating peptidase and unspecific proteinase activity. Some properties of this new enzyme, such as pH, stability, effect of metals and other potential inhibitors, kinetics, and specificity are described. The bacterial enzyme is more specific than pancreatic elastase, has a lower pH optimum, and is not affected by 1% NaCl and serum inhibitors.

Molecular characteristics of a crystalline human macroglobulin.

A. Caputo and E. Appelle (Scientific Department of Istituto "Regina Elena" per lo Studio e la Cura dei Tumori, Rome, Italy) *Arch. Biochem. Biophys.* **91**, 201 (1960). A method for the isolation of crystalline macroglobulin from human serum is described. This protein behaves in electrophoresis as a monodisperse system. Its isoelectric point, computed from its mobility-pH curve, has been found at pH 6.4. The average value of $D_{20,w} = 2.12 \times 10^{-7}$ has been obtained for its diffusion constant. The sedimentation diagram is characterized by the presence of three components with sedimentation constant value of $S_{20,w}^{(1)} = 15$, $S_{20,w}^{(2)} = 44.5 \times 10^{-13}$. The influence of acid, alkali, urea, guanidine, and detergent has been studied. Upon addition of mercaptoethanol, the macroglobulin dissociates into 6 S units, but it does not dissociate in the presence of other reducing agents. The average molecular weight of 1.28×10^6 has been calculated from light-scattering measurements, and intrinsic viscosity has been calculated as 0.19.

Effects of the insecticides DDT and Dieldrin on phosphorus metabolism of the adult housefly *Musca domestica* L.

F. P. W. Winteringham, G. C. Hellyer and M. A. McKay (Agricultural Research Council, Pest Infestation Laboratory, London

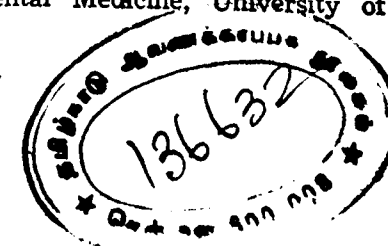
Road, Slough, Bucks) *Biochem. J.* **76**, 543 (1960). At the late prostrate stage there is a significant breakdown of thoracic adenosine triphosphate in DDT-poisoned houseflies. This fall could be reversed by injecting aqueous glucose. There was also a significant breakdown of thoracic adenosine triphosphate in DDT-poisoned insects spared the hypermotor activity by cyclo propane anaesthesia. cyclo Propane also failed to prevent the enhanced desiccation associated with DDT poisoning. The fall in adenosine triphosphate and respiration rate of DDT-poisoned houseflies is not due to the exhaustion of endogenous reserves or to the hypermotor activity induced by DDT. In both DDT- and dieldrin-poisoned houseflies there was a fall in the level of thoracic α -glycerophosphate, which could not be reversed by cyclopropane anaesthesia.

A protein disulphide reductase from pea seeds.

M. D. Hatch and J. F. Turner (Plant Physiology Unit., Division of Food Preservation and Transport, C.S.I.R.O., Botany School, University of Sydney, Australia) *Biochem. J.* **76**, 556 (1960). Protein disulphide reductase, which catalyses the reduction of protein disulphide groups, was purified approximately 40-fold from pea-seed extracts. The enzyme utilized reduced di- and tri-phosphopyridine nucleotide to reduce protein-disulphide groups. The rate of reaction with reduced triphosphopyridine nucleotide was approximately twice that with reduced diphosphopyridine nucleotide. A protein fraction from pea seeds was used as substrate in most experiments. The enzyme also reduced disulphide groups of a pea-seed glyceraldehyde 3-phosphate-dehydrogenase preparation and of some other enzymes and proteins. Cystine reductase and glutathione reductase, both of which were present in crude pea-seed extracts, were not involved in the reduction of protein-disulphide groups. The effects of pH and concentration of reduced triphosphopyridine nucleotide on the enzyme activity were studied. Protein disulphide-reductase activity was strongly inhibited by low concentrations of p-chloromercuribenzoate, iodoacetate, Hg^{2+} ions, Ag^+ ions, Cu^{2+} ions, Zn^{2+} ions and arsenite. Active preparations of the enzyme were obtained from a number of plant tissues. A possible mechanism of action of protein disulphide reductase is presented.

The effect of growth and function on the chemical composition of soft tissues.

Elsie M. Widdowson and J. M. T. Dickerson (Medical Research Council, Department of Experimental Medicine, University of



Cambridge) *Biochem. J.* 7, 30 (1960). Skin, cardiac muscle, liver, kidney and brain of man and the pig have been analysed in the foetus, in the new-born, during the suckling period and in the adult. Development was associated with a fall in the proportion of water and an increase in the proportion of nitrogen in all tissues; foetal heart muscle, and foetal liver and kidneys reached their adult composition before skin and skeletal muscle, and it is suggested that this is related to their early functional development. Next to skeletal muscle the skin is the largest soft tissue of the body, and changes in its composition make a significant difference to the composition of the body as a whole. The proportion of collagen per kilogram of skin increased during development, both in absolute terms and as a percentage of the total nitrogen. The cellular constituents were at a maximum at about the time of birth. The hearts of the still-born babies contained considerably less potassium than did the foetal hearts. Two possible explanations are put forward for this anomalous finding. Human brain contained more water and less nitrogen and phosphorus than pig brain at corresponding stages of development. This may be due to a larger amount of grey matter in human-brain substance.

The amino acid sequence around the reactive serine residue of some proteolytic enzymes.

M. A. Naughton, F. Sanger, B. S. Hartley and D. C. Shaw (Department of Biochemistry, University of Cambridge) *Biochem. J.* 77, 149 (1960). The diisopropoxy (^{32}P) phosphinyl derivatives of chymotrypsin, trypsin, and elastase were subjected to partial acid hydrolysis and the products investigated after ionophoretic fractionation. During acid hydrolysis an inter-conversion of the aspartyl peptides occurs in which the normal α form is converted into the $\alpha\beta$ and β forms. By comparison of the radio-phosphinyl derivatives of the three enzymes it is concluded that elastase, like trypsin and chymotrypsin, contains the sequence Asp-Ser-Gly around its reactive serine residue.

NOTES & NEWS

East German Delegation at Madras

Dr. G. Reich, Deputy Director of the Freiberg Leather Institute and Mr. H. Wächtler, Chief Director, the Association of People's Own Works (VVB), Leipzig, German Democratic Republic, toured India between 19th March and 3rd April, 1961. They visited Bombay, Madras, Calcutta, Delhi and Agra in the course of their tour. The East German visitors were at Madras from the 20th to 25th March, 1961. In Bombay, Calcutta, Delhi and Agra, Dr. Reich and Mr. Wächtler visited the Small Industries Service Institutes and acquainted themselves with the state of the leather industry there. While at Madras, they visited the Central Leather Research Institute and held discussions with the research staff. Important leather factories like the Chrome Leather Co., Gordon Woodroffe & Co., India Leather Corporation (tannery and warehouse), the Leather market in Madras and the Leather Export Promotion Council also were visited by them.

On Friday, the 24th March, 1961, they addressed the staff of the Central Leather Research Institute. Mr. Wächtler spoke on the leather industry of the German Democratic Republic and Dr. Reich on the Freiberg Leather Institute. In the course of his talk, Dr. Reich conveyed the hearty greetings of Prof. F. Stather, Director of the Freiberg Leather Institute, to the staff of the Central Leather Research Institute and hoped that this visit of a representative of the Freiberg Leather Institute to the Central Leather Research Institute in Madras would be the beginning of a closer collaboration between the oldest and the youngest of the leather institutes.

Meeting of The Leather Development Council

The Fourth Meeting of the Development Council for Leather, Leather Goods and Pickers Industries was held at Agra on March 31, 1961. Smt. Sucheta Kripalani, Minister for Labour and Industries, Uttar Pradesh, inaugurated the meeting.

In his welcome address, Sri M. L. Khaitan, Chairman of the Development Council, remarked that it was in the fitness of things that the meeting should take place in Agra known for its footwear and leather products. The Chairman expressed his disappointment at the way the leather industry was run and the shabby way it was cared for, the working conditions being very

far from satisfactory. The remedy required a co-operative effort of shoe makers themselves and speedy efforts at implementing the Government policies for the help and proper development of small scale industries. Setting up of industrial estates containing scores of units would be another solution. So it was fortunate that Smt. Kripalani, who was directly connected with the industries of the State and with labour, was present at the meeting.

Inaugurating the meeting, Smt. Kripalani referred to the important role of leather and leather goods in the economy of the country and of the collection of hides, skins and bones in rural economy. Since India was the foremost producer of hides and skins, it was of prime importance that an allout effort was made to maintain the position and to avoid wastage in collection, preservation and utilisation. It would also be worthwhile if the export of leather goods and footwear was augmented. Referring to the recent fall in the production of chrome tanned leather in U.P. because of the non-availability of quality cow hides, due to ban on cow slaughter, Smt. Kripalani said that processess should be evolved to develop quality leather.

The target of production fixed by the Development Council for footwear in the Third Plan period, continued Smt. Kirpalani, was 153 million pairs per annum. While the organised sector would be capable of achieving the target fixed for it, the cottage and small scale sector required special attention and it was hoped that the problems in this sector would receive the careful consideration of the Leather Development Council.

The Council made the following recommendations :

1. The small scale units or societies engaged in the production of footwear be assisted financially and technically.
2. The Director-General, Supplies and Disposals, be requested to keep samples of all the articles which they require to purchase from small scale and cottage sectors in the office of State Directors of Industries or in those of Directors of Small Industries Service Institutes so that the cottage and small scale sector could take advantage of the same.
3. Either the existing leather finishes manufacturers or a new entrepreneur should be allowed to develop powder and resin finishes and suitable sulphonated oils. Till such know-how comes into the country, it would be advisable to allow imports of these items according to the requirement of tanners.

4. The Development Wing should encourage the establishment of a factory for the manufacture of 1,000 tons of synthetic tannins a year as bleaching, retanning or auxiliary tanning material. Until this industry develops, import should be freely permitted.

5. The existing dye-stuff manufacturing units should be asked to increase the range of different types of dye-stuffs and colours taking into account the demands of the leather industry. If this is not immediately possible, imports of special dye-stuffs not made in the country should be permitted.

6. Existing tannin extract manufacturers should experiment with other tanning materials for production of self tanning agents in order to cut down a substantial part of the import and effect foreign exchange saving.

7. The Development Wing should try and encourage the establishment of specialised leather auxiliary manufacturing unit. To make it profitable, it may be worthwhile for the syntan or the unit manufacturing finished and sulphonated oils to be included with this leather auxiliary venture.

8. The Government of India be approached to permit export of tanned and finished crocodile and python skins.

9. The export of finished and processed leather instead of semi-finished hides and skins should be encouraged. The Council took note of the views of the members that the setting up small scale production units for the manufacture of leather goods from low grade chrome tanned leathers for home consumption would enable tanners to switch over their tanning from vegetable tanning to chrome tanning and finishing and earn more foreign exchange.

10. The Council reiterated its previous recommendation that the footwear industry in all the sectors should co-operate and should be encouraged to expand in order to achieve the target recommended by the Council. The rate of increase in the large scale sector and the small scale sector should be regulated in such a way that the existing ratio 1:9 between these sectors is not disturbed. The position could be reviewed after every two years.

11. Since the Indian Leather Technologists' Association is greatly interested in actively participating in the Seventh Convention of the International Association of Leather Chemists in Washington in August 19, and the persons would be attending the

convention at their own expenses, the Government might give them necessary help for attending the convention.

12. Since the organisation of the Development Commissioner, Small Scale Industries, has not so far sent a report regarding the survey conducted by them in respect of leather, leather goods industries, they should be reminded to take early action in the matter.

13. Regarding the difficulty faced by the tanners in the Madras State by the enforcement of Factory Act and Rules, it was suggested that the tanners in Madras should themselves take up the matter with the State Government in the first instance.

14. The vegetable tanning material Sub-Committee may go round the wattle plantations in the Madras State to look into the implementation of the wattle plantation scheme.

Shipments of Hides and Skins During March, 1961

Shipments during March, 1961 were as follows (in bales) : 3714 tanned cow hides, 244 cow calf skins, 51 buffalo hides, 744 buffalo calf skins, 596 goat skins, 536 sheep skins to U.K.; 9 cow hides, 273 cow calf skins, 323 buffalo calf skins, 1,203 goat skins, 515 sheep skins to Continent; 103 buffalo hides, 263 buffalo calf skins, 135 goat skins, 13 sheep skins to U.S.A.; 3 goat skins, 222 sheep skins to Japan; 1 cow calf skins, 88 goat skins, 1 sheep skins to Eastern Europe; 14 goat skins, 7 sheep skins to Australia and New Zealand. Total 9,058.

The Mail: April 9, 1961.

Development of Livestock

Third Plan Schemes

Addressing the 44th meeting of the State Livestock Improvement Board held at the Madhavaram Milk Colony, at Madras, Mr. M. Bhaktavatsalam, Minister for Agriculture, outlined the development schemes under "Animal Husbandry" and stated that a sum of Rs. 352.25 lakhs had been set apart for the Third Plan period for animal husbandry development schemes and Rs. 275 lakhs for dairy development and milk supply schemes in this State. He observed that since the last meeting at Hosur, they had made substantial progress in their Plan schemes. Against the Plan provision of Rs. 217.48 lakhs for the whole Second Five Year Plan

period, the Government had spent nearly Rs. 190 lakhs. They had to remember they had still a long way to go in developing livestock and dairy industry in this State to the desired level.

Referring to the Third Plan proposals, the Minister stated that the Third Plan "aims at the consolidation of the livestock development work initiated during the Second Plan period and further intensification of this work." The schemes proposed covered the development of cattle, sheep, poultry and pigs. Provision had also been made for increasing the facilities under veterinary education, research and "animal husbandry statistics." The programme also provided for improving veterinary aid in rural areas and for the effective control of livestock diseases.

Making a reference to the working of key village scheme, the Minister said that it played an important role in the development of livestock on an all-India basis. During the Third Plan period, he said, they proposed to extend the area of operation of each Key Village Block from six to ten villages, so as to cover 10,000 cows or buffaloes of breedable age, against 5,000 animals previously covered in each of the blocks. Twenty such blocks would be established during the Plan period, besides expanding ten existing blocks on the model of the new blocks. Besides this, provision had been made for starting 50 Key Village Extension Centres, three livestock farms, out of which one would be a buffalo-farm, 20 goshalas, a sheep farm, 12 sheep and wool extension centres and 20 poultry extension centres. Special emphasis had been laid on poultry development, in view of its quick multiplicity and in order to exploit this source of nutritious food material to the maximum extent possible. Apart from State ventures, it was proposed to encourage farmers to take to poultry farming by giving incentives.

The Institute of Veterinary Preventive Medicine, Ranipet, would be strengthened during the Plan period, and a Foot and Mouth Disease Laboratory would also be established. There is a provision of Rs. 50 lakhs for the development of mixed farming practices.

Mr. Bhaktavatsalam also stated that livestock shows at district and State levels would be conducted to create healthy competition among livestock-breeders. Intensive campaign for the mass castration of scrub bulls would be undertaken. One hundred and fifty veterinary dispensaries would be started during the period, preferably at the block levels to provide veterinary aid in rural

areas. An intensive campaign would be undertaken to control ranikhet disease, which took a very heavy toll of poultry. A pilot scheme for cattle insurance would be introduced. A Livestock Research Station would be set up to conduct specialised study of matters connected with animal genetics, animal nutrition, etc. Provision had also been made in the Plan for improvement of slaughter houses. A centre would be established for hide-flaying and curing, and a mobile bone-crushing unit would also be set up.

The Hindu : April 12, 1961.

Insurance of Cattle

Pilot Scheme for State

The Madras Government have decided to introduce a pilot project for cattle insurance in this State for which they have made a provision of Rs. 1 lakh in the Third Five-Year Plan.

The decision to introduce the scheme has been taken in pursuance of the suggestion of the Union Government that it be implemented in Madras State.

Recommending the scheme, the Union Government in a note to the State Government have stated that widespread epidemics of contagious diseases are of frequent occurrence and kill or incapacitate large numbers of animals. Frequent outbreaks of contagious diseases have been recognised as a "major cause of agricultural indebtedness in India." And until insurance protection is provided as a device for absorbing the shock of periodical crop failures and cattle epidemics, it would be impossible to save the agriculturist from debt.

"Cattle insurance", the note says, "is not only effective as a means of making good the losses through death of animals", but it will also have the result of reducing the number of deaths. "This is important since the loss by death is only a small fraction of the loss that the cultivator suffers due to diseases among animals. Cattle insurance will ensure active co-operation between the Veterinary Departments and the people in problems of disease control."

The main type of cattle insurance policy suggested by the Union Government would be 'a term insurance contract' under which an indemnity is provided in case of death of the insured animal during specified period of six months or one year. The insurance sum would not exceed two-thirds of the value of the

animal as determined at the beginning of this period. The owner of the animal will pay an annual premium of 7½ per cent of the insured amount. Only animals between the ages of 3 and 10 would be accepted for insurance. The period of insurance will not exceed one year. At the end of each period, the animals would be revalued and examined whether they are in sound health.

All insured animals would be protected against major contagious diseases, free of cost to the insured. To deal with cases when the insured animal is transferred or sold, provision would be made for refund of the part of the annual premium. The scheme also provides for an endowment insurance policy.

The Union Government scheme also envisages the implementation of the scheme through the formation of Co-operative Cattle Insurance Societies. The administrative machinery contemplated for the scheme includes valuation committees in the co-operative societies which would take up the work of valuation of animals and this committee would be helped by a stock supervisor who will function for a group of 20 villages. In addition, there will be a cattle insurance officer who will be placed in charge of groups of villages.

A spokesman of the Madras Government told a representative of *THE HINDU* that the details of the scheme were being worked out. Though the pattern of the scheme as drawn up by the Central Government would be largely adopted, it might be modified to suit local conditions of this State. It was proposed, to utilise the provision of Rs. 1 lakh in the Plan to meet the cost of the staff in implementing the scheme. The intention was to apply the scheme in the first instance to highly pedigreed and valuable animals", whose cost was about Rs. 500 and above each. The success of the scheme would largely depend on the response that they received from cattle owners.

The Hindu : April 13, 1961.

Russia to buy Indian Cattle

India will be exporting cattle to the Soviet Union for the first time when the two Soviet experts who are here complete their deal for the purchase of Kankerej cows and buffaloes of Murrah variety.

These experts with the help of an official of the National Livestock Committee are already busy inspecting the cattle in the villages near Delhi. They have also inspected some villages

near Bombay. In all, the Russians are expected to buy about 200 Murrah buffaloes and Kankerej cows.

It is learnt that the Russians propose to use these for cross-breeding with Soviet cattle in Uzbekistan.

The Hindu: April 30, 1961.

Indian Standards Institution Specifications

Physical Test for Industrial Water:

The object of IS: 1631-1960 Methods of test (physical) for industrial water published recently by ISI is to guide water testing laboratories in testing water for industrial use. The tests covered in this standard are regarding general appearance, colour, turbidity, odour, pH value, electrical conductance, total solids, ignited residue and suspended matter and total dissolved solids. Some of the methods prescribed may be applicable to sea water, sewage and trade effluents also, but these have not been specifically covered.

The standard published in English is priced at Rs. 2-50.

Mineral Gypsum:

The purpose of IS: 1290-1960 specification for mineral gypsum for ammonium sulphate and cement industries published recently by ISI is to guide the trade about using right quality of gypsum in the manufacture of ammonium sulphate and cement.

The quality of mineral gypsum available in India is very inconsistent and the sulphate percentage in any single deposit varies. The ratio between the high grade gypsum of above 80 per cent sulphate content and the rest is generally 1:3. Consequently, a huge amount of low grade gypsum, for which economical beneficiation arrangements are not available at present, remains untapped causing considerable difficulty to the mining industry. To offset this huge national waste, it is essential that a particular industry should derive its supply of the necessary quality of gypsum and not of a higher or lower quality.

The standard published in English is priced at Rs. 1-50.

Mutton Tallow:

The ISI has just published IS: 887-1960 specification for mutton tallow primarily with a view to encouraging the production of mutton tallow in this country of a quality that is acceptable to the textile industry. The standard has, however, been so formu-

lated as to meet other industrial uses of mutton tallow also, such as in the manufacture of soaps and fatty acids.

Tallow is obtained from the body-fats of cattle, sheep and goats. Of these, the fat derived from sheep, namely, mutton tallow, is widely used in India whereas the quantities of beef tallow and goat tallow used are comparatively small. Hence, this present standard relates to the requirements for mutton tallow only.

The standard published in English is priced at Rs. 1-50.

Vegetable Tanned Hydraulic Leather:

The ISI will shortly be issuing a draft revision of IS: 581-1954 specification for vegetable tanned hydraulic leather for wide circulation to all interests concerned for eliciting technical comments.

This standard was originally issued in 1954. The present revision incorporates the amendment to the requirement for the fats and oils content which was considered necessary for technical reasons. In addition, alignment of the standard, in respect of requirements for tanning and other characteristics, especially with those laid in the series of standards concerning heavy leather has received adequate attention. The experience of all interests concerned in the use of the original standard has also been freely drawn up.

Copies of the draft standard will be available free on request.

Sole Leather, Cycle Saddle Leather and East India Tanned Kips:

The latest additions to the series of Indian standards on leather and leather goods are the following three specifications published recently by the ISI:

- (1) IS: 1636-1960 Chrome waxed sole leather
- (2) IS: 1637-1960 Cycle saddle leather
- (3) IS: 1639-1960 East India tanned kips and skins

The standards lay down the chemical requirements and methods of test for the material covered by each.

Chrome waxed sole leather is manufactured in India from buffalo or extra heavy bull or ox hides by one-bath chrome tanning process followed by hot stuffing with solid fats and waxes with or without rosin. The finished leather is water-proof, non-slippery and very resistant to abrasion. Waxing makes the leather hard and impervious to wetting but offers no difficulty in stitching. Its

wearing property is comparatively much greater than unwaxed chrome sole leather or vegetable tanned sole leather.

Good cycle saddles require well-tanned leather butts from good quality and sound hides of buffalo, cow or ox, free from flay cuts. The tannage and the subsequent treatments require scientific control in order to produce the desired characteristics for the leather which should be strong, durable, able to withstand sudden strain and able to carry a steady load without undergoing any appreciable deterioration. The leather should be not too stretchy, but at the same time pliable with the ability to retain its shape when made into a saddle and also during subsequent use. In the absence of well defined standards, the manufactured products are of variable quality.

The East India tanning industry has been, for over a century, a valuable foreign exchange earner to the Indian Government fetching as much as Rs. 250.00 million annually. For the smooth working of such a valuable export trade, the maintenance of integrity through standards is essential. The fact that this trade has existed for over a century suggests that some sort of quality control, grading etc. within the trade are practised. In fact, a system of assessment and arbitration is prevalent, but the methods followed under the system are based on age-long, master-to-the-pupil experience. However, this very useful knowledge gained through experience by the sorters has not been resolved and expressed in scientific terms in the form of a standard specification wherein the chemical characteristics of the material are clearly stipulated.

Realizing the widespread production and increasing demand of these products in the country, it was felt necessary to lay down the basic requirements of the materials in order to ensure uniform quality in their supply.

The standards published in English are priced at Rs. 1-50 each.

Institution of Chemists (India)

Associateship Examination, 1962

The Twelfth Associateship Examination of the Institution of Chemists (India) will be held in November 30, 1961. The Examination in Group A (Analytical Chemistry) is divided into the following eleven Sections and each candidate will be examined in two of them according to his choice as approved by the Council, in addition to the General Chemistry including Organic, Inorganic,

Physical and Applied Analytical Chemistry: (1) Analysis of Minerals, Silicates, Ores and Alloys, (2) Analysis of Drugs and Pharmaceuticals, (3) Analysis of Foods, (4) Analysis of Water and Sewage, (5) Biochemical Analysis, (6) Analysis of Oils, Fats and Soaps, (7) Fuel and Gas Analysis, (8) Analysis of Soils and Fertilisers, (9) Analysis connected with Forensic Chemistry, (10) Analysis connected with Leather Chemistry and (11) Analysis connected with Textile Chemistry. The Examination is recognised by the Government of India as equivalent to M.Sc. in Chemistry for purposes of recruitment of Chemists.

Further enquiries may be made to the Honorary Secretaries, Institution of Chemists (India), Chemical Department, Medical College, Calcutta-12.

Government Leather Institute, Kanpur

The Annual Day of the above Institute was celebrated on March 28, 1961, under the Chairmanship of Sri B. Swarup, I.A.S., Joint Director of Industries, (E) U.P. Sri K. S. Smith, F.C.W.A., A.C.I.S., General Manager, Cooper Allen Branch, Kanpur, was the Chief Guest. Presenting the annual report, Sri G. Roy Choudhury, Principal, outlined the activities of the Institute contributing to the promotion of technical training and development of the leather industry. Sri K. S. Smith speaking on the occasion, stressed the necessity of learning the modern techniques of leather manufacture particularly keeping in view the paucity of suitable hides and skins. Sri B. Swarup appreciated the good work done by the Institute towards dissemination of technical knowledge. He added that he would be looking for the day when the Institute would be upgraded to a Degree College having all latest equipments and conduct more research to achieve further progress. Sri N. Misra proposed a vote of thanks.

Institute of Leather Technology, Madras

The Annual Day of the above Institute was celebrated on April 7, 1961, under the presidentship of Sri P. Sabanayagam, I.A.S., Director of Industries and Commerce. Sri B. Doraiswamy, Student Chairman, welcomed the gathering. Sri B. Venkata Reddi, Principal, presenting the annual report, traced the history of the Institute and emphasised the services of the same to trade and industry. Sri P. Sabanayagam spoke in appreciation of the services done by the Institute to leather trade and industry. Sri R. S. Balasubramaniam, Student Secretary, proposed a vote of thanks.

CLRI NEWS

Dr. Y. Nayudamma, Director, attended the Second Seminar on Leather and Leather Goods organised by the Small Industries Service Institute, at Calcutta on 6th to 8th April 1961; attended the meeting of the Board of Directors of the Mysore Chrome Tanning Co. at Bangalore, on 28th April, 1961.

Dr. S. K. Barat, Assistant Director, attended the meeting of the Goat, Sheep and Wool Committee of the Indian Council of Agricultural Research, at New Delhi between 17th to 19th April, 1961; visited the Gut Manufacturing Centres at Meerut (21st April, 1961); visited tanneries and gut centres in Agra (24th April, 1961); visited tanneries at Kanpur and attended the Selection Committee meeting for recruitment of personnel for the proposed CLRI Extension Unit at Kanpur.

The Director, CLRI or his representative has been nominated as a member of the Sub-Committee for the E. I. Tanned Hides and Skins constituted by the Department of Industries and Commerce, Madras.

The CLRI has become a member of the 'Comité International de Thermodynamique et de Cinétique Electrochimiques' (International Committee of Electrochemical Thermodynamics and Kinetics) and Dr. D. Ramaswamy has been nominated as the representative of this Institute.

Shri C. Koteswara Rao who was holding a CSIR Fellowship during the years July 1958 to March, 1961 has been awarded the M.Sc. degree of the University of Madras.

Dr. R. B. Hajela, CSIR Senior Research Fellow has resigned with effect from 30-4-1961.

Editor Y. Nayudamma. Published by N. Subramaniam, on behalf of the Central Leather Research Institute, Adyar, Madras-20. Printed by S. Ramaswami, at The G. S. Press, 21, Narasingapuram Street, Mount Road, Madras.

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PROCESS BULLETIN IN TAMIL

Contains eleven vegetable tanning processes and one chrome tanning process for manufacture of sole leather.

Further details may be had from:

**The Director, Central Leather Research Institute,
Adyar, Madras-20.**

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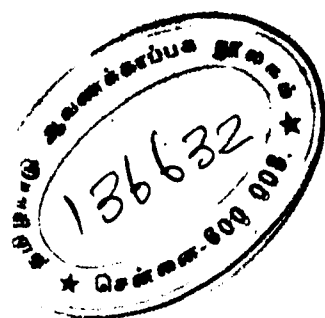
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