

**WOOL FOLLICLE DEVELOPMENT IN RELATION TO FLEECE
TYPE IN BARKI, MERINO, OSSIMI AND TEXEL SHEEP**

By

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SUMMARY

The wool follicles shape was found to be spiral in the Merinos, curved in the Texel and nearly straight in the Ossimi and Barki sheep. At six months of age, the wool follicles became more spiral in the Merino, more curved in the Texel and nearly curved in the Ossimi and Barki sheep.

The average length and the average depth of the wool follicles bulb were greater in the native than in the imported sheep in all of the ages studied, except at birth at which the Texel exceeded all the other groups of sheep in this respect. Both length and depth of wool follicles increased greatly with age in the native sheep.

The density of the primary follicles was nearly the same in the different groups of sheep at one year of age, while the density of secondaries were higher in the imported than in the native sheep.

INTRODUCTION

Many workers have pointed out to the fact that the different types of fleece represented in the various breeds of sheep are mainly different in their wool follicle group characteristics. Coarse-wool sheep of eastern origin were not studied in this respect along with the effect of the sub-tropical climates on both fine and long-wool sheep. In this work the development of the wool follicles in the Ossimi, Barki, Merino and Texel was studied in this respect under the local conditions of the Tahreer province in U.A.R.

MATERIALS AND METHODS

Skin samples were obtained from the mid-side position of five females of each of the Barki, Precoce Merino, Ossimi and Texel groups at six months interval from the day of birth till the age of twelve months.

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The methods used in the study were those previously described by Marai and Shafei (1964).

Statistical analysis were carried out after Snedecor (1952).

The abbreviations used in the following plates are listed below :

Ap. gl.	: Apocrine gland.
Ap. gl. d.	: Apocrine and duct.
Bb. S.	: Bulb of secondary follicle.
Bl. v.	: Blood vessel.
Med.	: Medulla.
Seb. gl. p.	: Sebaceous gland of primary follicle.
Seb. gl. s.	: Sebaceous gland of secondary follicle.

RESULTS AND DISCUSSION

A.—*Vertical Aspect* :

The wool follicles were spiral in the Merinos and curved in Texel sheep (Plates 1, 2, 3, 4, 5 and 6). Whilst they were nearly straight in the native groups, i.e. Ossimi and Barki sheep (Plates 7, 8, 9, 10, 11 and 12). The difference in the shape of the wool follicles between the native and the imported sheep breeds may be related to the crimpness of the wool in the different groups as the spiral and curved follicles tend to produce fibres with more crimps than the straight ones.

Comparing the shape of the wool follicles at the different ages studied in the different groups of sheep, it was observed that, at six months of age, the wool follicles were more spiral in the Merinos, more curved in the Texels and were nearly curved in the Barki sheep than in the other ages studied (Plates 1 - 12). This difference in the shape of the wool follicles at the mentioned ages may be related to the difference in the quality of wool which is better in the lamb wool than in the other cuts taken from the animal during its productive life.

The average length and the average depth of the wool follicles bulb were greater in the native than in the imported sheep in most of the ages studied (Tables 1-5). However, at birth, the Texel significantly exceeded the Ossimi sheep in all respects (Table 5). Also, highly significant differences were found between the Texels and Merinos in the mentioned measurements at six and twelve months of age (Table 5).

TABLE 1.—LENGTH OF PRIMARY WOOL FOLLICLES
IN SOME PURE BRED SHEEP (millimeter).

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth . . .	1.09	1.74	1.23	1.03
6	1.33	1.78	2.21	2.11
12	1.22	1.89	2.61	2.74

TABLE 2.—LENGTH OF SECONDARY WOOL FOLLICLES
IN SOME PURE BRED SHEEP (millimeter).

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth . . .	0.77	1.45	0.92	0.73
6	0.89	1.48	1.98	1.76
12	1.07	1.35	2.33	2.32

TABLE 3.—DEPTH OF PRIMARY WOOL FOLLICLES
IN SOME PURE BRED SHEEP (millimeter).

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth . . .	1.04	1.67	1.08	0.87
6	1.17	1.64	1.84	1.78
12	1.11	1.65	2.15	2.36

TABLE 4.—DEPTH OF SECONDARY WOOL FOLLICLES
IN SOME PURE BRED SHEEP (millimeter).

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth . . .	0.75	1.41	0.82	0.06
6	0.71	1.34	1.62	1.39
12	1.02	1.22	1.89	2.00

TABLE 5.—TEST OF SIGNIFICANCE ("T" VALUES OF THE SIGNIFICANT
VALUES ONLY) OF BREED* DIFFERENCE IN THE LENGTH AND
DEPTH OF WOOL FOLLICLES.

Items	Age (Months)		
	Birth	6	12
Length of primary follicles.	T.&O. (4.843†)	B.&T. (5.069†)	O.&T. (4.618†)
	O.&M. (2.404*)	T.&M. (6.986†)	T.&M. (5.186†)
Length of secondary follicles.	T.&O. (7.344†)	B.&T. (3.155*)	O.&T. (7.537†)
		T.&M. (5.112†)	T.&M. (5.676†)
Depth of primary follicles.	T.&O. (6.906†)	T.&M. (6.218†)	O.&T. (5.831†)
	M.&B. (2.778*)		T.&M. (8.207†)
Depth of secondary follicles.	T.&O. (8.530†)	T.&M. (1.0728†)	O.&T. (9.137†)
	M.&B. (3.019*)		T.&M. (3.098*)

* Significant at 95% probability.

† Significant at 99% probability.

B. = Barki sheep.

M. = Merino breed.

O. = Ossimi sheep.

T. = Texel breed.

& = And.

The values of the average length of the wool follicles in the imported sheep were near to that of the depth, while the length of the native sheep follicles was remarkably more than that of their depth (Tables 1 - 5). This was related to the angle between the follicles and the skin surface which was more acute in the native sheep than in the imported ones (Table 6).

Both length and depth of wool follicles increased with age.

TABLE 6.—WOOL FOLLICLE ANGLE IN SOME PURE BREEDS OF SHEEP.

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth	75	72	58	63
6	77	58	56	53
12	73	70	51	60

The greatest increase occurred in the period between birth and six months of age (Tables 7 - 10). This was nearly 100 percent in the native breeds compared to 20 percent in the Merinos. In the Texels, the values decreased in the length of the secondary follicles and depth of both primaries and secondaries (Tables 7 - 11). The effect of age on the mentioned characters was highly significant in case of Ossimi, Barki and Merino groups (Table 11).

TABLE 7.—EFFECT OF AGE ON THE LENGTH OF THE PRIMARY WOOL FOLLICLES REPRESENTED AS PERCENTAGE VALUE TO THE INITIAL 100% VALUE AT BIRTH.

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth	100	100	100	100
6	122	102	180	205
12	112	109	212	266

TABLE 8.—EFFECT OF AGE ON THE LENGTH OF THE SECONDARY WOOL FOLLICLES REPRESENTED AS PERCENTAGE VALUE TO THE INITIAL 100% VALUE AT BIRTH.

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth . . .	100	100	100	100
6 . . .	116	102	215	241
12 . . .	139	93	253	315

TABLE 9.—EFFECT OF AGE ON THE DEPTH OF THE PRIMARY WOOL FOLLICLES REPRESENTED AS PERCENTAGE VALUE TO THE INITIAL 100% VALUE AT BIRTH.

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth . . .	100	100	100	100
6 . . .	112	98	170	205
12 . . .	107	99	199	271

TABLE 10.—EFFECT OF AGE ON THE DEPTH OF THE SECONDARY WOOL FOLLICLES REPRESENTED AS PERCENTAGE VALUE TO THE INITIAL 100% VALUE AT BIRTH.

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth . . .	100	100	100	100
6 . . .	95	95	198	232
12 . . .	136	86	230	333

TABLE 11.—TEST OF SIGNIFICANCE ("t" VALUE) FOR THE EFFECT OF AGE (BETWEEN BIRTH AND TWELVE MONTHS) ON LENGTH AND DEPTH OF WOOL FOLLICLES.

Items	Groups			
	Merino	Texel	Ossimi	Barki
Length of primary follicles .	4.303°	0.932	13.946°	10.174°
Length of secondary follicles	4.893°	2.114	15.389°	12.551°
Depth of primary follicles .	33.287°	0.212	14.114°	18.065°
Depth of secondary follicles	4.112°	3.743°	12.293°	15.777°

B.—Horizontal Aspect:

The horizontal aspect of the wool follicle group components in the different breeds of sheep studied were, in general, similar to those reported for other breeds of sheep by Margolena (1954) and Hardy and Lyne (1956).

The average number of primary wool follicles per unit area of skin was greater in the Ossimi, Merino and Barki sheep than in the Texels, at birth (Table 12). The differences between the Ossimi and the Merino sheep and between the Merino and Barki were not significant while they were highly significant between the Barki and Texel sheep (Table 15). The average number of secondaries and the average total number of wool follicles per unit area of skin were higher in the Merino sheep than in the Barki and Ossimi at the same age (Tables 13 and 14). The Texel exceeded the Barki and the latter surpassed the Ossimi sheep with highly significant values in the secondary follicles density (Table 15).

TABLE 12.—THE NUMBER OF PRIMARY WOOL FOLLICLES PER SQUARE MILLIMETER OF SKIN IN SOME PURE BRED SHEEP.

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth . . .	14.1	10.0	15.1	13.0
6 . . .	5.7	5.3	4.1	4.0
12 . . .	3.8	4.7	3.5	3.8

TABLE 13.—THE NUMBER OF SECONDARY WOOL FOLLICLES PER SQUARE MILLIMETER OF SKIN IN SOME PURE BRED SHEEP.

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth . . .	31.4	30.7	15.5	20.4
6	36.5	19.1	12.7	13.4
12	32.3	17.7	10.2	11.2

TABLE 14.—THE TOTAL NUMBER OF WOOL FOLLICLES PER SQUARE MILLIMETER OF SKIN IN SOME PURE BRED SHEEP.

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth . . .	45.5	40.7	30.6	33.4
6	42.2	24.4	16.4	17.4
12	36.1	22.4	13.7	15.0

TABLE 15.—TEST OF SIGNIFICANCE ("T" VALUES OF SIGNIFICANT CASES ONLY) OF BREED DIFFERENCE IN DENSITY (Np AND Ns) OF WOOL FOLLICLES.

Items	Age (Months)		
	Birth	6	12
Np	B. & T. (6.399*)	T. & O. (5.164°)	T. & M. (10.762°)
Ns	T. & B. (6.623*)	M. & T. (10.684°)	M. & T. (10.162°)
	B. & O. (3.935*)	T. & B. (7.541°)	T. & B. (15.977°)

* Significant at 99% probability.

Np = Number of primary follicles per square millimeter of skin.

Ns = Number of secondary follicles per square millimeter of skin.

B. = Barki sheep.

M. = Merino breed.

O. = Ossimi sheep.

T. = Texel breed.

& = And.

At one year of age, the average number of primary wool follicles per unit area of skin was greater with highly significant value in the Texel than in the Merino sheep. While the values of the primary follicles density in the Merino, Barki and Ossimi sheep were nearly the same (Tables 12 and 15). The average number of secondaries and the average total number of wool follicles were greater in the Merino sheep than in the Texel, Barki and Ossimi sheep, respectively (Tables 12,13 and 14). The differences in the secondaries density values were highly significant between the Merino and Texel sheep and between the Texel and the Barki sheep (Table 15).

Since the density of primaries was nearly the same in the native and Merino groups of sheep at one year of age, while the density of secondaries and the S/P ratio are remarkably high in the Merino than in the native sheep (Tables 13 and 16), it could be inferred that the density of the secondaries is the most important factor in limiting the wool productivity of the individual. This is verified by the findings of Ghoneim (1959) who reported that the Merino had the highest fleece weight followed by the Texel than the native sheep.

TABLE 16.—THE S/P RATIO IN SOME PURE BREED SHEEP

Age (Months)	Groups			
	Merino	Texel	Ossimi	Barki
Birth . . .	2.2	3.2	1.0	1.6
6	6.7	3.8	3.2	3.2
12	9.7	4.0	3.2	3.2

ACKNOWLEDGEMENT

The authors wish to acknowledge Professor Dr. M. T. Ragab and Dr. M. M. Shafei for their help and criticism which has contributed much to this research.

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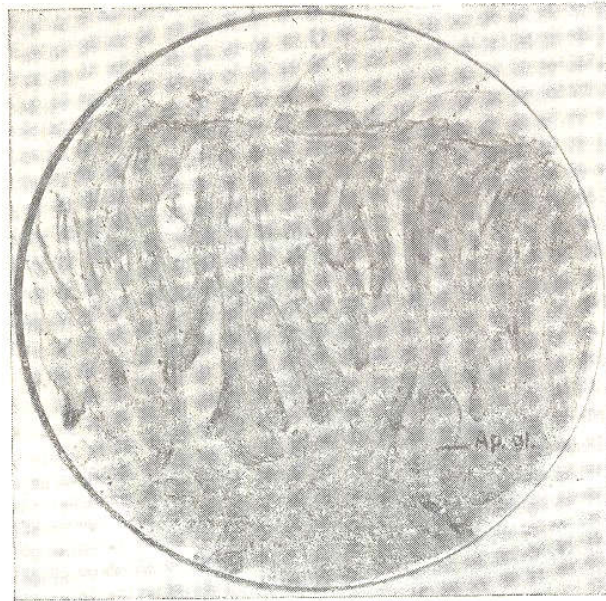


PLATE 1.—Vertical section of skin at one day old
in the Merino sheep ($\times 88$).

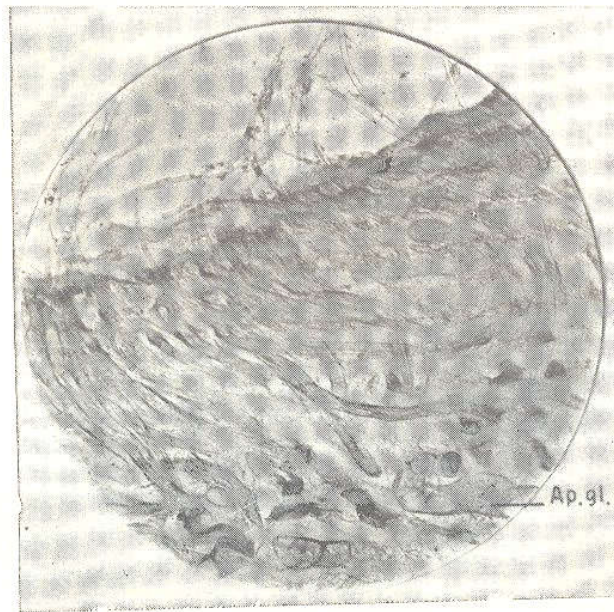


PLATE 2.—Vertical section of skin at six months old
in the Merino sheep ($\times 88$).



PLATE 3.—Vertical section of skin at twelve months age in the Merino sheep ($\times 88$).

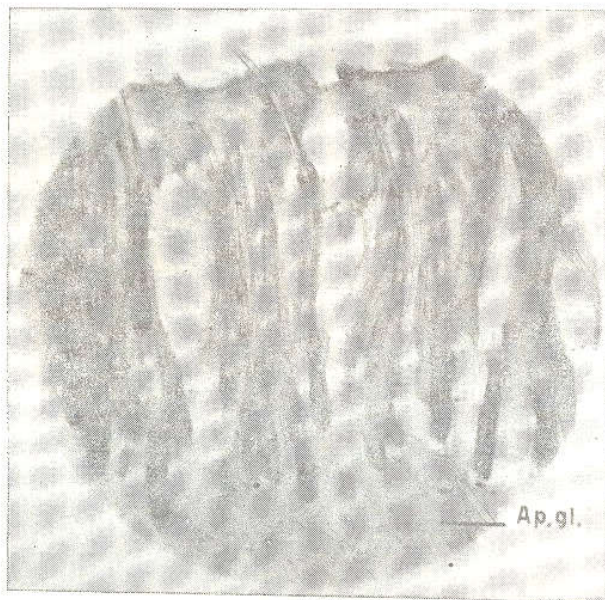


PLATE 4.—Vertical section of skin at one day old in the Texel sheep ($\times 88$).



PLATE 5.—Vertical section of skin at six months old
in the Texel sheep ($\times 88$).

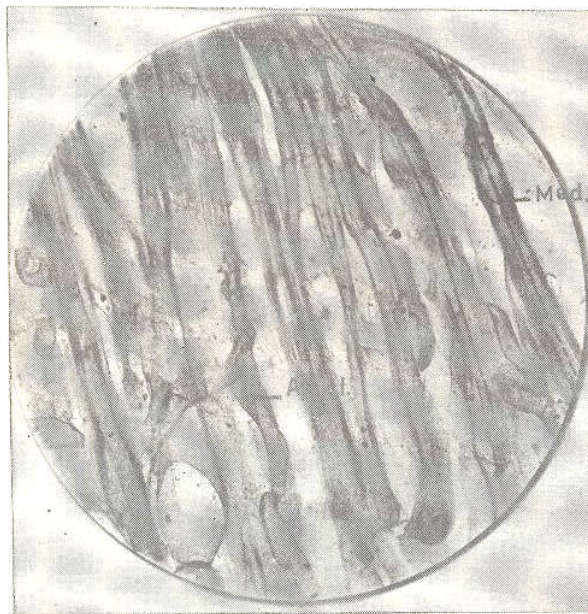


PLATE 6.—Vertical section of skin at twelve months
of age in the Texel sheep ($\times 88$).

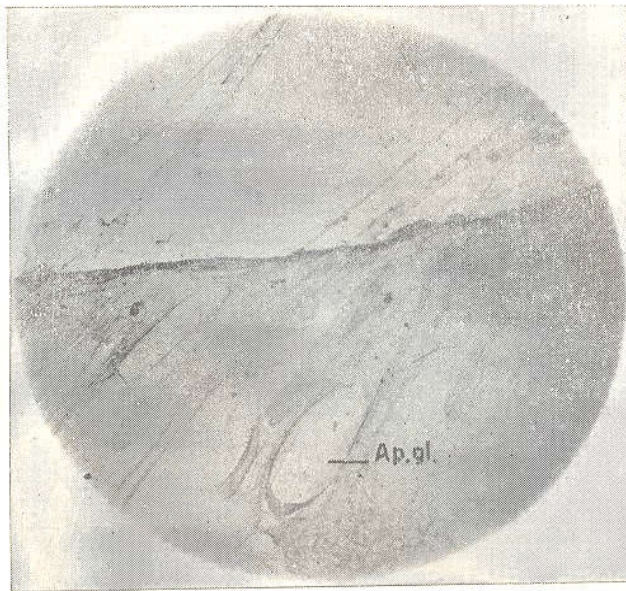


PLATE 7.—Vertical section of skin at one day old
in the Ossimi sheep ($\times 88$).

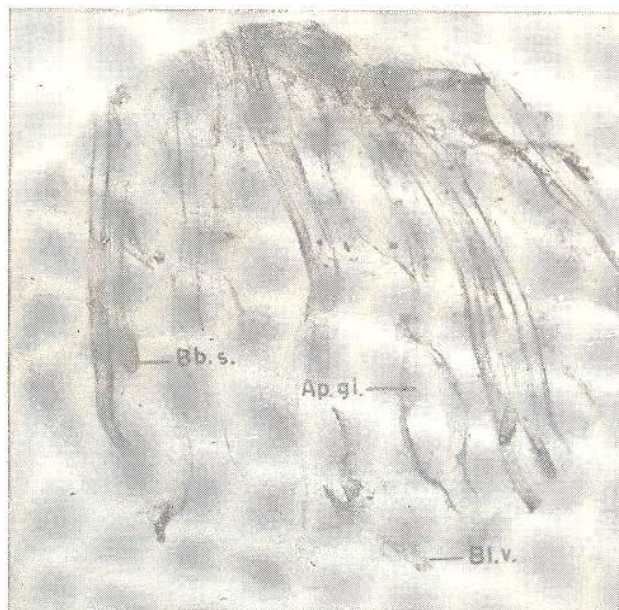


PLATE 8.—Vertical section of skin at six months old
in the Ossimi sheep ($\times 88$).



PLATE 9.—Vertical section of skin at twelve months of age in the Ossimi sheep ($\times 88$).

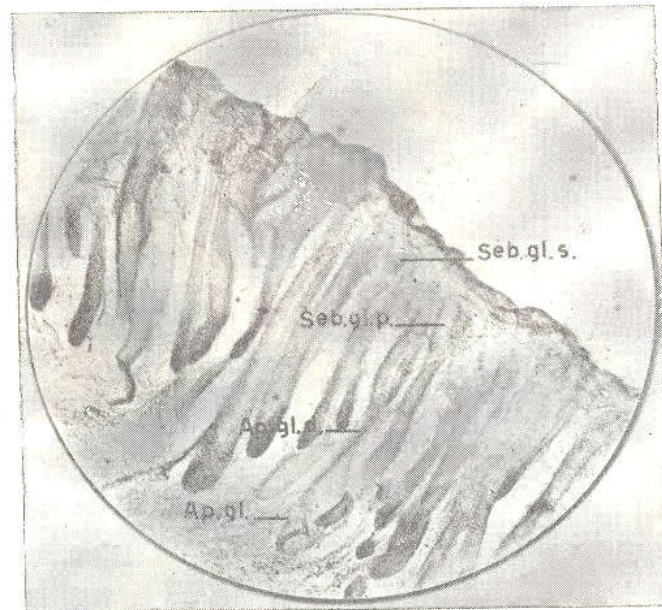


PLATE 10.—Vertical section of skin at one day old in the Barki sheep ($\times 88$).

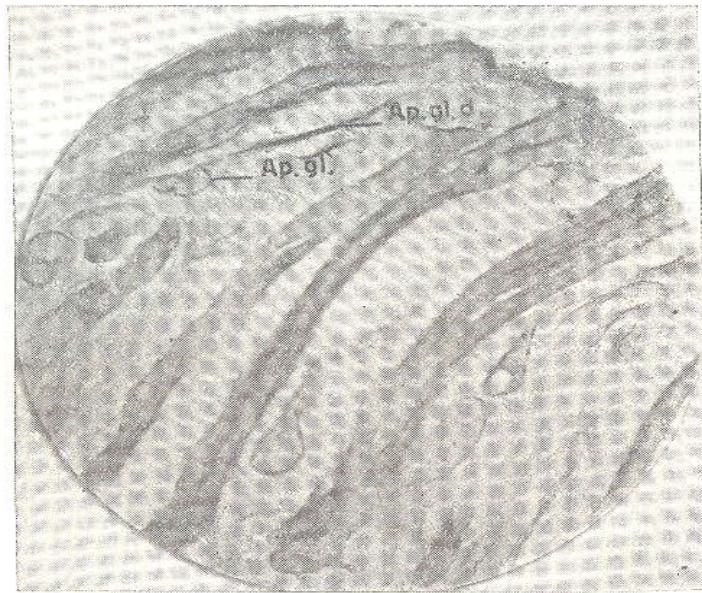


PLATE 11.—Vertical section of skin at six months old
in the Barki sheep ($\times 88$).

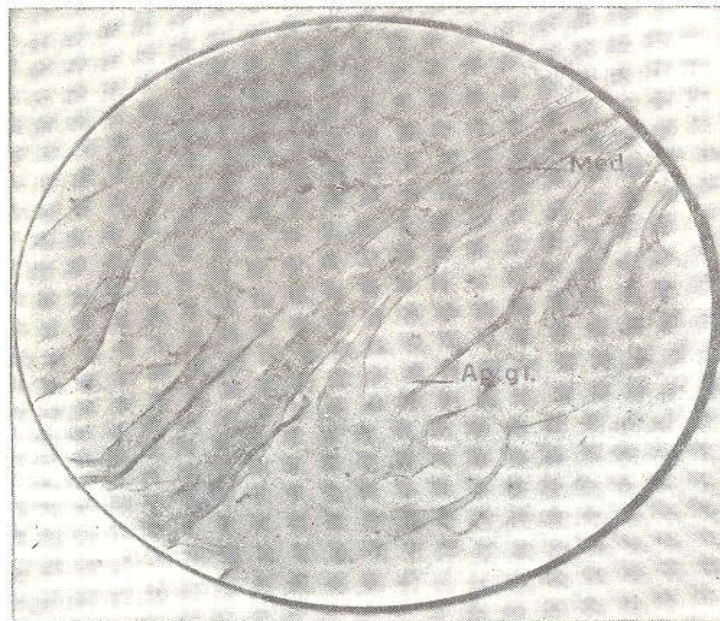


PLATE 12.—Vertical section of skin at twelve months
of age in the Barki sheep ($\times 88$).

الصوف في فروات أغنام البرقى والمرينو الأوسيمى والتكسل

الملخص

تبين من الدراسات أن جيوب الصوف تتميز بأنها ذات شكل لولبى أو منحنى فى كل من أغنام التكسل والمرينو - وذات شكل مستقيم تقريباً فى أغنام الأوسيمى والبرقى ، وقد لوحظ عند عمر ستة أشهر أنه ازداد وضوح الشكل اللولبى فى جيوب الصوف فى أغنام المرينو كما ازداد وضوح انحناء لجيوب فى أغنام التكسل - وأصبحت الجيوب منحنية تقريباً فى أغنام الأوسيمى والبرقى .

وقد كان متوسط عمق بصيلات جيوب الصوف أكبر فى الأغنام المحلية عما فى الأغنام المستوردة فى كل الأعمار التى درست - ما عدا عند الولادة حيث تفوقت أغنام التكسل على كل المجموعات الأخرى من الأغنام فى الصفتين المذكورتين ، وقد زادت الظاهرتان المذكورتان بدرجة كبيرة فى الأغنام المحلية بتقدم العمر .

هذا وقد كان متوسط غزارة جيوب الصوف الأولية متساوية تقريباً فى كل مجموعات الأغنام عند عمر سنة - بينما زادت غزارة جيوب الصوف الثانوية فى الأغنام المستوردة بدرجة أكبر عما فى الأغنام المحلية وذلك عند نفس العمر .