

an average elevation of 5,000 feet. On account of the two mountain systems near which it lies, this division is the one in which the rainfall is heaviest, being from ten to twenty inches.

Arizona differs from New Mexico and Colorado in that it has two rainy seasons. The summer rains which fall during July, August, and September are local in character, due to the influence of the mountains; they usually occur in the form of heavy afternoon showers, during which an inch of rain will not infrequently fall.

In October and November the rains do not altogether cease, but are light and infrequent. The winter rainy season begins in December and terminates in February.

"These rains are caused by the proximity of approach of great storms in low-pressure areas which form a part of the storm system of the country at large. . . . They are moderate in force and are interrupted by the anti-cyclonic types of high barometer and cloudless skies which are distinctive of the Pacific coast weather" (Captain Glassford).

Most of the precipitation on the mountains comes in the form of snow, and it remains there till summer; but on the plains it usually manifests itself as rain.

March, April, May, and June form the one dry season. This is in marked contrast to the spring weather of New Mexico and Colorado, which is comparatively moist. The winter rainfall is less than one-half of that of the summer season.

The number of cloudy days throughout the year, especially in the autumn, is about equal to that of New Mexico and Colorado, but in the plain country the number is decidedly less.

The wind movement is very small, especially on the plain.

"The belt of 50° F. or less mean annual temperature includes the northeast corner of the Territory above Fort Defiance. In the southern half of the Territory the mean temperature of 60° F. or more shades into the heat of the desert, with a mean annual temperature of about 70° and a monthly mean for July of 90° F."\*

The night temperatures in the plain country are high, increasing the objectionable features of the summer climate for most invalids; and the dust which is irritating and abundant, is more particularly so in the summer, so that throughout the territory of Arizona the summer heat is peculiarly trying, except at an elevation of 7,000 feet and upward, when the altitude exerts more influence upon the temperature than does the latitude. It is not, however, fair to estimate the effect of the heat entirely by the height of the thermometer, because what Prof. M. W. Harrington has happily termed † "sensible temperature" has to be taken into consideration.

"The published temperatures for the different weather stations are the readings of the ordinary dry-bulb thermometer. The influence of evaporation is shown by what is called the wet-bulb thermometer, the bulb having a covering of cotton or muslin which is kept moistened. The consequent evaporation from the surface of this wetted bulb is similar to that of the human body from which the perspiration is evaporated, thus causing coolness. The temperature shown by the wet-bulb thermometer is called the 'sensible' temperature, and is supposed to be the temperature felt at the surface of the skin. As a matter of fact, it is probably lower, because the cloth covering the wet bulb is continuously saturated with water, while the surface of the skin is usually but slightly moistened, and is not subjected to such rapid evaporation. The wind is an important factor in sensible temperature, because if the air is in motion that portion which is in contact with the human body is continuously replaced by dry air, while if the air is stationary it becomes slightly warmed and more humid from heat and moisture of the body, and the amount of evaporation from the surface of the skin is necessarily less. The amount of the reduction or cooling of temperature is in

\* "Handbook of Climatology," Solly, pp. 292.  
† Prof. M. W. Harrington: Transactions of the American Climatological Association, 1894.

direct ratio to the dryness of the air. It will be greatest where the air is driest, least where the air is most moist. The greater the depression of the dew point below the ordinary or shade temperature, the less the relative humidity; the drier the air, the more rapid the evaporation and the greater the consequent reduction of temperature. . . . This is true of all arid regions, where the difference between the dry and wet bulbs during the warmest and driest portion of the day will range from 20° to 40° F. or more."\*

The great drawbacks to the present use of Arizona by invalids are the scarcity of the resorts and the generally indifferent character of the accommodations. The chief resorts at present available are given in the order of their elevation above sea level:

**Yuma**, elevation 140 feet, population 1,200, lies in the great Arizona desert on the banks of the Colorado River, some sixty miles from the Gulf of California. The winter climate is peculiarly mild, dry, warm, and pleasant, and it is here that the benefits of desert air are best exhibited; but, unfortunately, the accommodations and resources are at present not worthy of the climate. The summer climate is far too hot for most invalids.

**Phoenix**, elevation 1,100 feet, population 10,000, is placed about two miles from the Salt River and is the largest and most important city in Arizona. It has good hotels and accommodations and the general resources of a prosperous Eastern city. The broad streets are shaded by trees and the houses are surrounded by grass lawns. It has an agreeable winter climate, with the least wind movement, perhaps, of any resort of like elevation. Being a little higher, it is not quite so hot as Yuma, and also is not quite so dry, because of the extensive irrigation which goes on in the Salt River valley in which it is situated; but it is admirably adapted for winter residence for patients to whom a warm dry climate without altitude is suited.

**Tombstone**, elevation 2,300 feet, population 2,500, is situated on a high bench overlooking the San Pedro River. Its winter climate is good; its accommodations are only moderate.

**Tucson**, elevation 2,400 feet, population 6,000, being higher is more bracing and cooler than Phoenix, and combines the advantages of desert air with slight altitude. It is a thriving city with fair accommodations.

**Castle Creek Hot Springs**, elevation 2,300 feet, is a small settlement with good accommodations and fine bathing facilities. It lies in a spur of the Bradshaw Mountains and is a four hours' ride from the Santa Fé, Prescott and Phoenix Railway. Its winter climate is said to be very agreeable, but weather reports are not at present available.

**Oracle**, elevation 4,500 feet, is a small settlement of a few ranches where boarders are taken, and the accommodations are plain but good. It is a forty miles' stage ride over a good road from Tucson. The pine-clad mountains afford shelter from the north. It is free from dust and cooler and more bracing than Tucson, and is a beautiful country which is pleasant to ride through.

**Prescott**, elevation 5,300 feet, population 3,000, lies sixty miles from Ashfork upon the Santa Fé, Prescott and Phoenix Railway. It is surrounded by beautiful mountain scenery, and has adjacent high benches with pines and sandy soil where the residences should be; but the town is unfortunately situated on adobe soil in the river valley, and the accommodations are indifferent. The climate, however, is excellent, resembling that of Denver, combining the advantages of upland air with the warmth which comes from its low latitude. The temperature range and wind movement are much greater than at the places previously mentioned.

The appended tables are abstracted from the author's paper on the "Comparative Merits of Resorts in New Mexico, Colorado, and Arizona," presented to the American Climatological Association.†

\* "Handbook of Medical Climatology," pp. 62-63.  
† Transactions of the American Climatological Association for 1897.

ANNUAL AVERAGES.

	Elevation.	Latitude.	Soil.	Normal air pressure.	TEMPERATURE.			HUMIDITY.				Number of cloudy days.	Mean monthly wind movement.
					Annual.	January.	July.	Relative humidity.	Absolute humidity.	Dew point.	Rainfall.		
Colorado Springs, Col . . . . .	6000	38.51	Gravel . . . . .	24.03	47	26	69	50	1.84	29	14.4	57	6666
Prescott, Ariz. . . . .	5300	34.33	Sand and adobe . . . . .	24.78	53	34	74	51	2.31	33	16	51	4898
Oracle, Ariz. . . . .	4500	32.50	Gravel . . . . .	25.11	63	45	80	32*	...	26*	17.7	...	...
Las Cruces, N. Mex. . . . .	3800	32.17	Adobe . . . . .	26.11	58	39	77	65*	...	47*	7	20	4948
Tucson, Ariz. . . . .	2400	32.14	Sand and gravel. . . . .	27.45	69	50	88	42	3.25	44	12	57	3735
Phoenix, Ariz. . . . .	1100	33.28	Adobe . . . . .	28.77	69	49	90	45	3.5	42	7	52	3379
Yuma, Ariz. . . . .	140	32.44	Sand . . . . .	29.92	72	53	92	46	3.19	43	2.9	15*	4319
Cairo, Egypt . . . . .	90	30.31	Sand . . . . .	30.2	72	54	86	61	5.42	58	.53	...	...

\* 1896.

SPRING SEASONAL AVERAGES.

SUMMER SEASONAL AVERAGES.

	Seasonal temperature.	Night temperature.	Relative humidity.	Absolute humidity.	Rainfall.	Number of cloudy days.	Hourly wind movement.	Seasonal temperature.	Night temperature.	Relative humidity.	Absolute humidity.	Rainfall.	Number of cloudy days.	Hourly wind movement.
Prescott, Ariz. . . . .	51	36	44	1.86	3.1	7	8.4	70	56	48	3.83	6.1	9	7.2
Oracle, Ariz. . . . .	60	48	...	...	1.5	...	...	78	68	...	...	6.5	...	...
Las Cruces, N. Mex. . . . .	58	...	...	...	.4	18*	...	76	...	...	...	4.7	21*	...
Tucson, Ariz. . . . .	62	47	37	2.27	1.2	7	5.3	69	40	40	4.05	5.4	13	5.1
Phoenix, Ariz. . . . .	67	54	33	2.23	.3	4	5.9	71	41	41	5.55	2.7	10	4.3
Yuma, Ariz. . . . .	70	...	43	3.43	.3	4	6.7	89	73	43	6.18	5	3	6.6
Cairo, Egypt . . . . .	74	...	52	4.94	.13	...	...	86	...	51	6.84	...	...	...

\* 1896.

AUTUMN SEASONAL AVERAGES.

WINTER SEASONAL AVERAGES.

	Seasonal temperature.	Night temperature.	Relative humidity.	Absolute humidity.	Rainfall.	Number of cloudy days.	Hourly wind movement.	Seasonal temperature.	Night temperature.	Relative humidity.	Absolute humidity.	Rainfall.	Number of cloudy days.	Hourly wind movement.
Prescott, Ariz. . . . .	53	37	49	2.21	2.7	4	5.9	35	27	57	1.4	5	8	6.3
Oracle, Ariz. . . . .	65	54	...	...	5.6	...	...	45.2	37	...	...	4.1	...	...
Las Cruces, N. Mex. . . . .	59	...	...	...	1.5	12*	...	45	...	...	...	1.37	1.17	...
Tucson, Ariz. . . . .	68	51	43	3.22	2.4	4	4	5.1	49	38	4.8	1.89	3	11
Phoenix, Ariz. . . . .	69	56	56	4.4	1.2	4	4.4	51	...	53	2.2	2.6	11	4.4
Yuma, Ariz. . . . .	73	57	46	4.04	.7	3	5.1	56	43	47	2.36	1.6	6	6.1
Cairo, Egypt . . . . .	78	...	70	6.32	.3	...	...	58	...	70	3.57	...	...	...

\* 1896.

The wind and humidity of Phoenix are based on one year only.

**ARM, THE.**—The arm begins at the lower anterior margin of the axilla—the lower border of the pectoralis major muscle—and ends at the elbow joint, where the joint capsule joins the humerus before and behind.

The skin of the arm is similar in structure to that of other uncovered skin surfaces of the body, is thin, especially at the front and sides, loosely attached to underlying structures, and is free from large hairs.

The superficial fascial layer contains fat tissue that rounds out the contour in the well-nourished, and especially in the female and female art figure.

The brachial fascia (deep fascia) is derived from the deep fascia of the pectoralis major in front, and from the insertions of the teres major and latissimus and their sheaths behind; from a prolongation of the deltoid fascia on the outer side, and, through the axillary fascia, from the deep fascia of the serratus magnus, upon the inner side of the arm. Coming together from these origins these fasciæ join to form a thin but firm sheath from shoulder to elbow. Arising from the external condylar ridge of the humerus and passing outward to meet this sheath is the external intermuscular septum, which extends from the condyle to the deltoid tubercle. Arising from the internal condyle and the internal condylar ridge, and extending from the coraco-brachialis insertion to the

elbow, is the internal intermuscular septum. These two septa divide the arm into two regions, the front and the back.

The front compartment of the arm contains biceps and brachialis; the coraco-brachialis being added at an upper-third arm section, and the brachio-radialis, and to a certain extent also the extensor carpi radialis longus, at a lower-third arm section.

The back compartment contains triceps and anconeus. These compartments contain also their respective blood and nerve supplies. The musculo-spiral nerve passes backward, downward, and outward, with its accompanying superior profunda artery, through the interseptal space between the internal and external heads of the triceps, from a point high up in the back compartment. The musculo-cutaneous nerve passes forward, downward, and outward from the brachial plexus in the axilla, through the coraco-brachialis and between the biceps and brachialis above in the front compartment, the brachial artery supplying this compartment throughout. Still lower down in the arm, above the elbow, we have practically in the external intermuscular septum, the musculo-spiral nerve and the superior profunda artery, and within the enfolding of the internal intermuscular septum, the ulnar nerve and the inferior profunda artery.

The conformation of the front of the arm is due to the form of the biceps, which rounds well forward. At the slight groove at the inner and outer base of the biceps are placed respectively the basilic and cephalic veins, which extend from their anastomoses at the elbow upward along

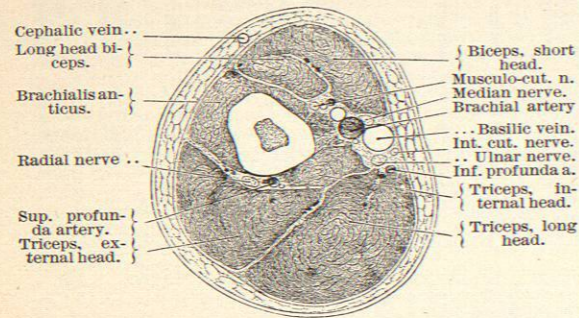


FIG. 274.—Transverse Section of Arm just below Insertion of Deltoid. (From Joessel: "Lehrbuch der topographisch-chirurgischen Anatomie," Bonn, 1884.)

the borders of the biceps to join their outlet, the axillary veins, at the inner and outer sides of the arm and shoulder.

In association with the skin we find, forming the cutaneous supply of the outer arm, from the shoulder to the wrist: circumflex, upper external cutaneous branch of the musculo-spiral, lower external cutaneous branch of the musculo-spiral, and cutaneous branches of the musculo-cutaneous. In the skin and superficial fascia of the inner arm and forearm is the cutaneous supply of the inner arm and forearm: intercosto-humeral, internal cutaneous branches of the musculo-spiral, lesser internal cutaneous (Wrisberg's), and internal cutaneous.

A few small lymphatic nodes upon the inner side of the arm, just above the elbow, may be found in the superficial fascia near the course of the basilic vein.

The lowest point of the insertion of the deltoid marks the middle of the humerus, the middle of the musculo-spiral groove behind, the lower border of the coraco-brachialis insertion, and the upper limits of the brachialis.

**THE FRONT OF THE ARM.**—Just within the anterior fascial compartment is the biceps, which lies upon the brachialis, while the latter, in turn, lies upon the anterior surface of the humerus. Along the inner border of these two muscles is the brachial artery. The artery winds about the humerus from the mid-axillary space, high up in the arm, to the internal septum in the mid-arm, to the anterior part of the brachium at the elbow. The terminal branches of the brachial plexus also conform to this route through the arm.

The *biceps* arises from the scapula by two heads: the long head above the glenoid fossa of the scapula, the short head, in common with the coraco-brachialis, from the tip of the coracoid process. From these two tendinous origins, these heads swell into long muscular bellies that converge and lie side by side in the upper third, and unite at the lower third of the arm. Toward the bend of the elbow the muscle fibres converge upon a centrally placed short, stout tendon, which is inserted upon the posterior facet of the tuberosity of the radius, a bursa occupying the anterior facet over which the tendon plays when the forearm is flexed. The fascial sheath of the arm anteriorly, after becoming distributed to bony parts of the elbow and condylar ridges, receives in front of the elbow a strong, flattened band of fibres from the biceps tendon, the semi-lunar or bicipital fascia, which is continuous with the deep fascia above and is lost over the pronator teres below in the ulnar fascia. This fascia bridges over the brachial artery and separates it from the median basilic vein.

The *brachialis* arises from the whole lower half of the inner and outer surfaces of the humerus, from the front of the internal intermuscular septum, and from a part of the external intermuscular septum above a point where

the musculo-spiral nerve pierces it. Its origin embraces the insertion of the deltoid. The muscular fibres converge broadly into a short, thick, tendinous insertion upon the coronoid process. This muscle is overlaid by the biceps, but projects beyond it inward and outward. It is overlapped on the inner side by the brachial artery, by the median nerve, and by the pronator teres; also, deeply, by the anterior branch of the anastomotica magna and the anterior ulnar recurrent artery. Upon its outer side it is overlapped by the radial recurrent artery, by the radial nerve, and by the brachio-radialis and extensor carpi radialis longus; also deeply, by the musculo-spiral nerve and by the terminal branch of the superior profunda artery.

The *coraco-brachialis* is an elongated muscle arising in common with the short head of the biceps from the tip of the coracoid process. It is inserted on the inner border of the shaft of the humerus at about its middle. It lies, in its lower part, along the inner border of the biceps, the two muscles lying to the outer side of the brachial artery.

The *brachial artery* is the direct continuation of the axillary at the level of the lower border of the teres major. Therefore the lower half of the third portion of the axillary artery lies uncovered by muscle in the upper arm. The brachial extends a short distance below the elbow where it ends in its two terminal branches—the radial and ulnar arteries—on opposite sides of the radius near the junction of its head and neck. The course of the artery is sinuous; it lies at first internal to the humerus, then in front of the bone, and, at the bend of the elbow, midway between

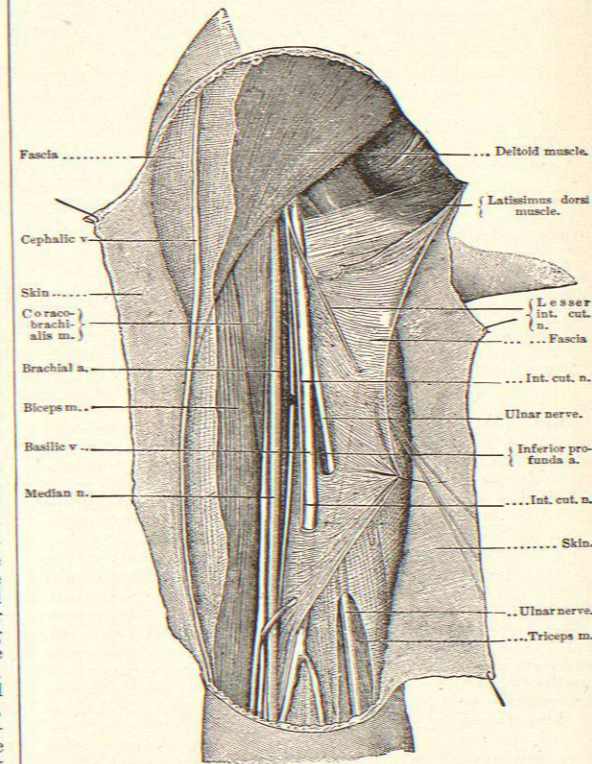


FIG. 275.—Dissection of the Arm, Anterior and Internal Surface. The skin and fasciae have been turned back. (From Joessel.)

the condyles. Compression of the artery at any point in the arm should be outward toward the bone above, outward and backward at its lower third, directly backward

below. Throughout its course the artery occupies a position near the surface. It lies at first upon the long head of the triceps, but is separated from the muscle by the musculo-spiral nerve and superior profunda artery, and is overlapped by the biceps. Next, it rests upon the inner head of the triceps, at the middle third of the arm, and is overlapped by the insertion of the coraco-brachialis. At its lower third, just before bifurcation, it lies upon the brachialis. It lies beneath the skin and fascia and is partially bridged over by the coraco-brachialis and biceps upon its outer side. At the bend of the elbow it is overlapped again by the strong bicipital fascia, is crossed by the median basilic vein, and dips deep into the triangular (antecubital) space between the brachio-radialis and the pronator teres. The sheath of the artery is closely incorporated with the deep fascia of the biceps, so that in ligation of the artery it moves in its position according as tension is put upon the muscle.

The *median nerve* follows closely the artery and its sheath, lying first to its outer side, then in front of it, and finally toward the elbow at its inner side. The *ulnar* and the *internal cutaneous nerves* lie to the inner side of and behind the artery till about the middle of the arm, when the ulnar diverges to pass well backward, to reach the internal intermuscular septum above the internal condylar ridge, where it enters the posterior compartment of the arm. The *internal cutaneous* pierces the brachial fascia and passes forward just below the middle of the arm, and it lies between the brachial artery, to the outer side, and the basilic vein upon the inner, to be wholly superficial at the elbow. The *musculo-spiral nerve* lies for a very short distance behind the brachial artery upon the long head of the triceps before it is joined by the superior profunda branch and gains the musculo-spiral groove.

The artery gives off the superior profunda, the inferior profunda, the anastomotica magna, the nutrient, the muscular, and the terminal—the radial and ulnar arteries.

The *superior profunda artery* which lies first to the inner, then to the posterior side of the brachial, rises usually just below the teres major, perforates the septum, and then penetrates to the musculo-spiral groove, in which it runs for a certain distance. It gives off above, an ascending branch that supplies the triceps and forms an important anastomosis with the posterior circumflex. The cutaneous branches follow the nerve and supply the skin over the outer arm. The articular branch is given off behind the external intermuscular septum and runs downward in the substance of the triceps, anastomosing with the interosseous recurrent below, and, across the joint behind, immediately above the olecranon fossa, by an arch with the anastomotica magna. The terminal branch perforates the septum to become anterior at the elbow, and it anastomoses with the radial recurrent. It often gives off a nutrient artery or arteries to the upper end of the humerus, and it gives muscular branches to the triceps.

The *inferior profunda* usually rises from the inner side of the brachial about opposite the lower part of the coraco-brachialis insertion. It passes with the ulnar nerve through the internal intermuscular septum to back of the condyle, and there, under cover of the tendinous aponeurosis of the flexor carpi ulnaris, it anastomoses with the posterior ulnar recurrent and anastomotica magna. It supplies the humerus, triceps, and elbow joint, and it frequently gives off a branch that passes to the front of the joint and anastomoses with the anterior ulnar recurrent.

The *anastomotica magna* usually rises from the inner side of the brachial, a short distance above the bend of the elbow, runs downward and inward across the brachialis, and divides into an anterior and a posterior branch. The anterior branch anastomoses in front of the internal condyle, beneath the pronator teres, with the anterior ulnar recurrent. From this branch a branch often passes behind the condyle to anastomose with the posterior ulnar recurrent and the inferior profunda. The posterior branch perforates the internal septum, passes to the posterior sur-

face of the internal condylar ridge, pierces the triceps, and there anastomoses with the articular branch of the superior profunda and with the interosseous recurrent.

The *nutrient* artery is given off variably from the brachial or one of its branches and passes through the nutrient foramen, downward toward the elbow. After entering the shaft of the bone, a branch passes upward toward the head and neck.

The *muscular branches*, from five to eight in number, are variably given off, from the outer side of the artery, to the coraco-brachialis, the biceps, and the brachialis muscles, usually at the points where the nerves enter these muscles.

The *musculo-cutaneous nerve*, arising from the outer cord of the brachial plexus, soon perforates the coraco-brachialis, and, still inclining outward, reaches the bend of the elbow and there piercing the fascia becomes superficial just at the outer border of the biceps tendon.

**THE BACK OF THE ARM.**—The *triceps* occupies the whole of the posterior compartment of the arm and is made up of three heads of origin. The long head rises by a flattened tendon from the upper part of the axillary border of the scapula and its adjacent lower glenoid rim. This tendon, with its muscle bundles, together with the outer (upper) humeral head, forms most of the superficial part of the muscle.

The inner head, rising below the musculo-spiral groove, is more deeply placed. The muscle bundles from these three heads converge below into a short common tendon which is inserted into the posterior part of the top of the olecranon process. A bursa underlies the tendon over the rest of the top of the process. The long head is joined upon its inner side by a slip of aponeurotic fascia derived from the lower border of the tendon of the latissimus. The outer, or upper, head occupies all the posterior and external surfaces of the humerus from the teres minor insertion to the groove. It also has fibres which are attached to the external intermuscular septum and the aponeurotic sheath bordering the groove. The groove is free. The inner, or lower, head rises from the posterior surface of the humerus below the groove and receives a narrow-pointed slip from high up near the insertion of the teres major, upon the inner side of the groove. It rises also from the whole length of the internal intermuscular septum and from a small part of the external intermuscular septum. The fibres of origin of the long and outer heads join and form a broad, flat tendon of insertion. A part of the fibres of this tendon are given off especially over the outer part of the elbow joint, and ultimately they expand so as to form a strong fascia that covers the forearm. The short fibres of the inner head are in great part inserted upon the deep surface of this tendon. A few fibres, however, are inserted directly upon the olecranon or into the posterior ligament of the elbow. The musculo-spiral nerve and the superior profunda artery supply muscular branches to each of the three heads.

The *musculo-spiral nerve* is the continuation of the posterior cord of the brachial plexus after there have been given off, in the axilla, the circumflex and the subscapulars. After passing for a short distance behind the lower part of the axillary artery and the upper part of the brachial artery, it dips backward, downward, and outward, from the position where it lies upon the lower part of the triceps, and then, after being joined by the superior profunda artery, it enters the musculo-spiral groove. It turns round behind the shaft of the humerus and appears at the outer side of the arm, where, at about four inches above the elbow joint, it pierces the external intermuscular septum and lies in the front compartment of the arm, deep between the brachialis on the inside and the brachio-radialis and the extensor carpi radialis longus upon the outside. In front of the external condyle of the humerus it divides into its terminal branches, the radial and the posterior interosseous. It gives off three cutaneous branches, and supplies muscular branches in the arm to the three heads of the triceps, the anconeus, the brachialis (in part), the brachio-radialis, and the extensor carpi radialis longus. The last three muscles are supplied

by branches given off in the front compartment. The *internal cutaneous branch* usually rises in the axilla in company with the branch which goes to the long head of the triceps, and then passes back of the arm. It supplies a middle dorsal strip of integument nearly as far down as to the elbow. The *upper external cutaneous branch* pierces the deep fascia in the line of the external intermuscular septum, at the upper third of the arm, accompanies the cephalic vein in the lower half of the arm, and supplies a strip of skin, from exit to elbow, on the antero-external surface of the arm. The *lower external cutaneous branch*, which is much larger, pierces the fascia somewhat lower down, and supplies the skin of the middle of the back of the forearm as far down as to the wrist. In its course it passes between the internal cutaneous nerve upon the inside and the musculo-spiral upon the outside.

The *lesser internal cutaneous nerve* (Wrisberg's) rises from the inner cord of the brachial plexus, passes as far down, in the front compartment, as to the inner side of the axillary vein, which latter separates it from the ulnar nerve, at the middle of the arm. At the elbow it turns backward to supply the skin over the olecranon.

The *internal cutaneous nerve* rises from the inner cord of the brachial plexus, and passes down the arm to the inner side of the brachial artery. With the basilic vein it perforates the deep fascia and supplies the skin of the upper and inner arm. Above the elbow the terminal branches, anterior and posterior, diverge slightly at the antero-internal side of the arm, to pass the elbow, where they supply the skin of the inner forearm, anteriorly and posteriorly, as far down as the wrist.

A terminal branch of the *musculo-cutaneous nerve* passes over the elbow and lies below in front of the radial artery. It supplies the outer side of the forearm, front and back.

Luzerne Coville.

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**ARM AND FOREARM, DISEASES AND INJURIES OF THE.**—In considering the diseases and injuries of the arm and forearm, I shall take up the different affections of the several structures under the following heads: I. Affections of the Skin; II. Affections of the Fascia; III. Affections of the Bones, the Periosteum, and the Joints; IV. Affections of the Muscles, Tendons, and Tendon Sheaths; V. Affections of the Blood-vessels; VI. Affections of the Lymphatic Vessels, Glands, and Bursæ; VII. Affections of the Nerves; VIII. Hysterical Lesions; IX. Tumors.

It will be my purpose to discuss more fully those affections of these different structures which show some peculiar manifestations when presenting themselves upon the upper extremities, and to deal with them less in detail when exhibiting upon the arm merely those features which are common to the same affections elsewhere in the body. Particularly in the case of diseases affecting the skin of the arm and forearm, not all the dermatic affections which may be found in this locality will be entitled to extensive consideration, but such forms of skin trouble only as are particularly prone to develop their lesions upon the arms. Furthermore, it will suffice with regard to most of these to call attention to the fact that certain lesions may be expected on the arms and forearms, and to describe their symptoms and appearance with sufficient accuracy to allow of their diagnosis, while more extended consideration of their pathology and treatment is to be sought under other headings in this work.

I. AFFECTIONS OF THE SKIN.

With regard to the diseases affecting the skin of the arms, we have to content ourselves for the most part with recording the observed fact of their appearance in this locality, owing to our ignorance of the causes that determine the outbreak of cutaneous lesions upon this part of the body.

It is necessary to bear in mind that the general prin-

ciples of dermatology are applicable here as in other parts of the body, notably those which teach us that symmetrical lesions may generally be considered to be due to internal causes, while for unsymmetrical lesions there is *a priori* reason to think of local irritation as a cause of the affection. Similar weight should be given to considering the relation of the cutaneous lesion to the clothing of the part, inasmuch as certain lesions are prone to appear on unprotected parts, while others appear where the friction of the clothing, or vermin which the clothing may harbor, may give rise to local irritation. Other matters concerning the site of lesions of the skin on the arms, which may affect the diagnosis, are the lines of cleavage of the skin, and the presence of the lesions upon the flexor or upon the extensor surface of the affected limb, and finally the known course of certain of the brachial nerves and blood-vessels. Nor should the general rule of dermatological practice be forgotten which teaches us to compare the integument of the arms with that of the rest of the body and so gain an accurate knowledge of the anatomical distribution of the cutaneous lesions.

The more recent nosological systems of dermatology have sought to group the various lesions of the skin according to their pathological basis, and in the rapid review which I purpose to make of such cutaneous affections as have their common site upon the arms and forearms, I shall consider the different lesions in the general order of the classification of Jessner—to wit, functional disorders, circulatory disorders, and inflammations, superficial and deep-seated; finally, I shall consider briefly traumatism of the skin.

(a) *Functional Disorders of the Skin.*—Of the first class, that of functional disorders of the skin, such as pruritus, hyperidrosis, seborrhœa, it will suffice to say that none of them have any predilection for the arms or forearms which would justify their consideration here, if we except the entirely unimportant erythema solare which is frequently seen on the arms of farmers, bathers, and laborers who work in the open air with the sleeves rolled up.

(b) *Circulatory Disorders of the Skin.*—Of the diseases of the skin classified by Jessner as circulatory disorders, the lesions of purpura and scurvy, while undoubtedly they show themselves with comparative frequency on the arms, yet it is rare that they should show themselves there with any special preponderance of distribution over other parts of the body. Peliosis rheumatica, however, is a purpuric affection whose predilection for the arms merits our attention in considering the cutaneous affections of these members.

In PELIOSIS RHEUMATICA, also called purpura rheumatica, a period of invasion precedes the eruption for a variable length of time, and is shown by general malaise, systemic disturbances, and painful swelling of the joints, especially of the knees, wrists, and ankles. The temperature may be normal, but more often it rises to 100° F. or more. In a few days the eruption appears and the pain then subsides. The lesions occupy practically the same regions as do those of erythema multiforme (*vide infra*), namely, the wrists, forearms, and lower legs, but sometimes they are particularly located about and around the inflamed joints. Some authorities indeed classify the affection as a variety of erythema multiforme. The lesions consist of bluish-red patches, and slightly elevated, bright-red papules which quickly become purplish; they may, however, be purpuric from the first. Their color cannot be effaced by pressure. After persisting for a few days, they pass through the various gradations of color seen in a contusion and disappear altogether. The disease may be limited to one outbreak, or the eruption may come out in several crops and run a course of from four to six weeks, or it may disappear altogether and ten days or more later a relapse occur, and the joint and other symptoms again become manifest. The recognition of hemorrhage into the skin is easy when it is borne in mind that pressure does not cause the redness to fade. Such lesions occupying the localities mentioned, and associated with the

systemic disturbance already described, with the joint swellings, pains, etc., are sufficient to constitute the diagnosis of peliosis rheumatica.

(c) *Inflammatory Diseases of the Corium and Subcutis.*—Of the inflammatory diseases of the skin, we can at once dismiss the specific exanthematous fevers of childhood as having no special predilection for the arms, and of the diseases under the nosological classification we are following, that known as LICHEN PLANUS is the first that arrests our attention. This is a disease whose predilection for the arms as a site for eruption is more marked than is the case in that just described. Indeed, it is often confined to the flexor aspect of the forearm, though it manifests a tendency in its course to spread over a greater part of the lower arm and of the forearm; but it never involves the whole skin as do eczema, psoriasis, and lichen ruber in certain cases. The following description of the symptoms and course of the disease is taken from Gottheil: Lichen planus occurs most frequently as a chronic and localized malady, the more acute and general form of the disease being rare. The site of the eruption is usually the flexor surface of the forearms, especially around the wrists and on the backs of the hands and the feet, but other regions are not infrequently affected, and it occurs occasionally on the palms, soles, and the genitals. It is rare, however, on the face and scalp. It is frequently symmetrical. The lesions appear first as extremely minute papules of a characteristic dusky red or purplish color, with a waxy glance, and sharply differentiated from the surrounding skin. Their sides are steep, and their shape is distinctly angular. Their tops are flat, and marked with a central depression or capped with a minute scale. On the palms and soles the individual lesions may be hard to distinguish, the entire epidermis of the affected region being elevated and thickened, cracked in places and of a dusky hue and covered with whitish scales. On the mucosæ they appear as whitish, flattened papules. They may be scattered or irregularly grouped. As they gradually enlarge to pea size, adjacent papules coalesce, and thus extensive indurated and scaly areas are formed; but the individual lesions do not increase beyond their original size. After persisting for a long time, months and years, they slowly undergo absorption, leaving atrophic, pigmented areas behind. No vesicles or pustules are ever formed, nor are the nails or the hair affected. The subjective symptoms are confined to a moderate itching, and it is only in very extensive forms that this becomes severe. The patients are sometimes debilitated and run down by excesses or overwork, but not infrequently they are in excellent health. The malady occurs with about equal frequency in both sexes. It is seen at all ages, but is most frequent during middle life.

The diagnosis rests upon the peculiar shape, size, grouping, and appearance of the papules as described above. *Papular eczema*, especially when situated on the forearm, may resemble lichen planus, but the papules are rounded and frequently have a little serum at their apices. They are intensely itchy, round, run a rapid course, and leave no pigmentation behind; and other eczematous changes, excoriation, oozing, or crusting will probably be found somewhere on the skin. In the *papular syphilitoderm* the lesions are round-topped and often arranged in crescentic or circular form; they are generally distributed, and more or less polymorphic; there is no itching, their color is reddish. Other signs of syphilis are probably present, and the disease responds to antiluetic treatment. In *lichen scrofulosus* the round papules are grouped upon the trunk and are accompanied by no subjective symptoms whatsoever. Finally in *psoriasis* the lesions are pink, covered with abundant, heaped-up scales, and are situated solely on the extensor surface.

The prognosis is favorable always. The disease is chronic and obstinate, but it tends to recovery. It may be added that the disease, though not common, is not excessively rare.

The grave progressive disease known as lichen ruber

may have some of its characteristic lesions situated upon the arms, but its distribution is so rarely limited to that locality that its discussion need not detain us here. When present upon the arms its tendency to follow and accentuate the folds and lines of cleavage of the skin sometimes leads, in the cubital folds, to the development of linear strings of papules, constituting what is known as "lichen ruber moniliformis."

Few of the forms of eczema confine themselves to the arms, though small patches of scaly eczema are not infrequently met on or near the wrists.

ECZEMA PAPULOSUM, however, is a form of eczema both common and obstinate which has a predilection for the limbs, both the arms and the legs, though it is met with on the trunk as well. Most forms of eczema are characterized by lesions with a more or less fluid exudation which loosens the superficial portion of the epidermis and spreads itself over the affected surface. In some cases of eczema, however, the tendency to exudation is lessened, and the probabilities are that it is less fluid in character, and under these circumstances does not gain the surface but collects at points beneath the epidermis, raising little solid projections which have received the name of papules. These may be somewhat closely aggregated, or there may be an appreciable distance between them, and the surface will be dry unless the pruritus leads to scratching and the edges of the papules are torn; in that case a small quantity of lymph may exude and dry into minute scales. In the course of time, however, the papules themselves tend to subside, and we have a surface somewhat glossy and scaly, but not to the extent usually seen in other varieties of eczema. This papular form of eczema has its seats of election. It is perhaps never seen on the scalp and some other parts, but it is quite common on the arms and forearms, thighs, and legs, especially their flexor aspects (Piffard).

ECZEMA FISSUM is still another variety of eczema in which we have neither vesicles, pustules, nor papules, nor the extensive exfoliation which characterizes the exfoliative form of this disease. We may have a more or less reddened surface, but instead of the lesions already mentioned we find small cracks or fissures extending through the stratum corneum and sometimes through the stratum Malpighii as well. The exudation in this fissured variety is slight, crusting is slight, and after a time the skin returns to the normal condition by a simple closing of the fissures and disappearance of the congestion. These fissures are perhaps more frequently met with behind the ears, on the palms and soles, and at the various flexures (Piffard).

ERYTHEMA MULTIFORME is the next disease under the head of cutaneous inflammations which claims our attention, on account of its frequent appearance on the forearms. Gottheil defines it as an acute inflammatory disease, characterized by the appearance of reddish papules, tubercles, vesicles, or blebs of symmetrical distribution, and affecting by preference the backs of the hands and the feet. Elliot remarks that it is one of the most striking and constant features of erythema multiforme that almost invariably the lesions appear first on the backs of the hands and extend to the forearms and then to the lateral portion of the neck and face. Frequently simultaneously, but more often later than on the hands, the eruption is manifested on the dorsum of the feet and on the anterior aspect of the legs. It is frequently absent altogether from these regions, and besides, the eruption will present much variation in individual cases. The eruption is always symmetrical, without, however, presenting absolute symmetry. Often one side of the body will be more severely affected than the other. Its symptoms, course, and the differential diagnosis are described by Gottheil as follows: After a prodromal period marked by a moderate febrile movement there appear on the backs of the hands and feet, or on the palms and soles, and more rarely on other parts of the body, a varying number of slightly elevated, firm, reddish-violet papules fading on pressure. This condition is known as erythema papulatum. In a few days the papules grow into tuber-