

Fig. 110.

Specimen no. 2 - 19 months.

Sagittal section X 5 lateral third temporomandibular meniscus.

- A. Pes menisci.
- B. Hela of pes menisci.
- C. Pars gracilis menisci.
- D. Pars posterior menisci.
- E. Inferior stratum.
- F. Superior stratum.
- G. Bilaminar zone.
- K. Lateral pterygoid muscle.
- O. Perichondrium.
- P. Inferior joint cavity.
- R. Periosteum.

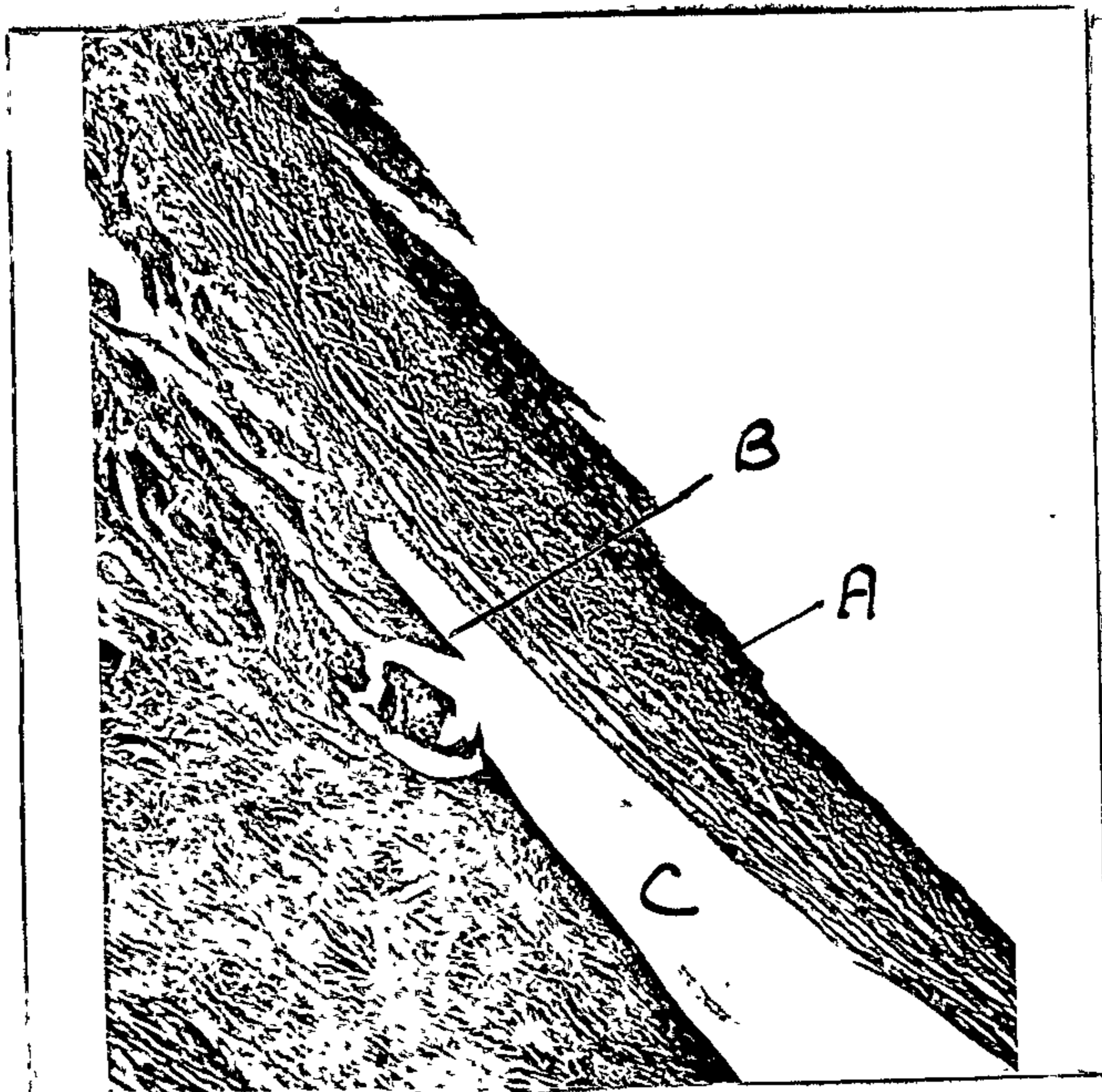


Fig. 111.

Perichondrium. (X 80 of. fig. 110.)

- A. Perichondrium.
- B. Small wedge shaped villus.
- C. Inferior joint cavity.

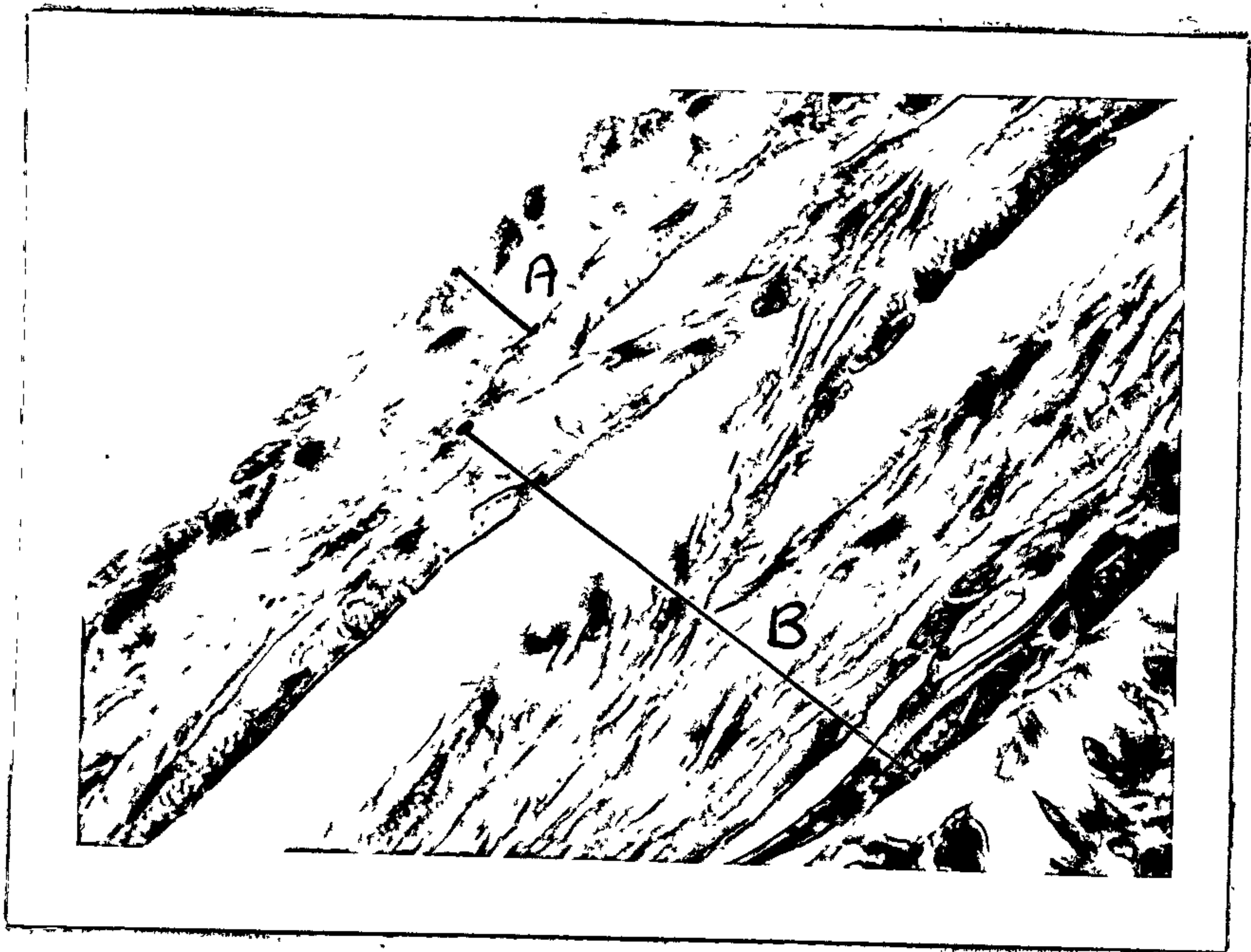


Fig. 112.

Superficial layer of perichondrium. (X 900 cf. fig. 110.)

- A. Superficial layer.
- B. Intermediate layer.

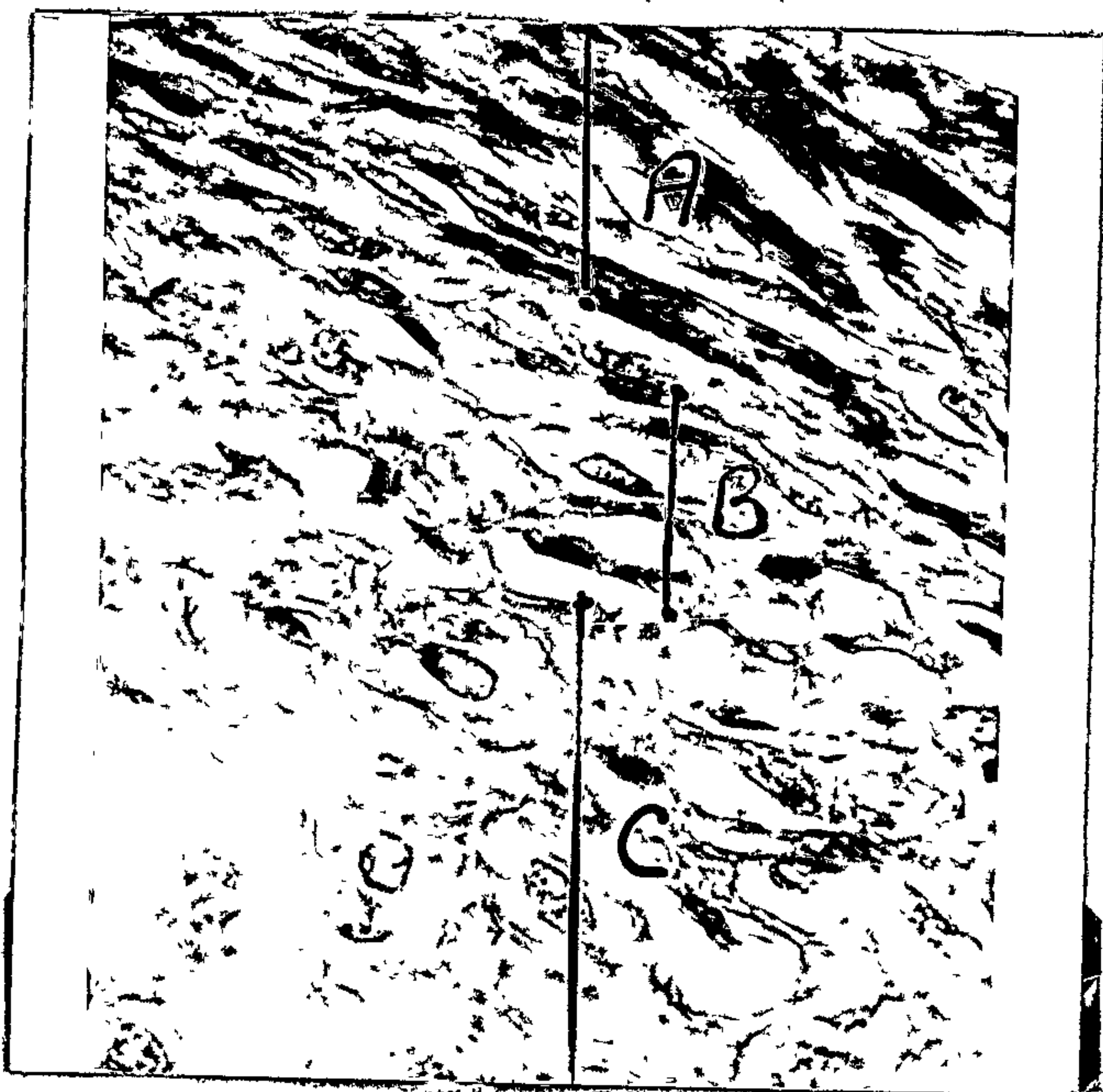


Fig. 113.

Chondrocytes beneath perichondrium. (X 900 cf. fig. 110.)

- A. Intermediate layer of perichondrium.
- B. Flattened chondrocytes.
- C. Mature and hypertrophic chondrocytes.

Pes Menisci. (cf. fig. 110.)

The pes menisci is almost entirely constituted by the inserting fibres of the lateral pterygoid muscle. (fig. 114.) Here definite tendons can be seen which merge with the collagenous fibres of the pes menisci. (fig. 115.)

The hyla of the pes menisci (fig. 116) is apparent and this is composed of unorientated collagenous fibres in comparison to the well orientated fibres of the pes menisci. The tendinous insertion is associated with blood vessels and nerves. The main cell component is elongated fibroblasts which are disposed between the bundles of collagenous fibres. (fig. 117.)

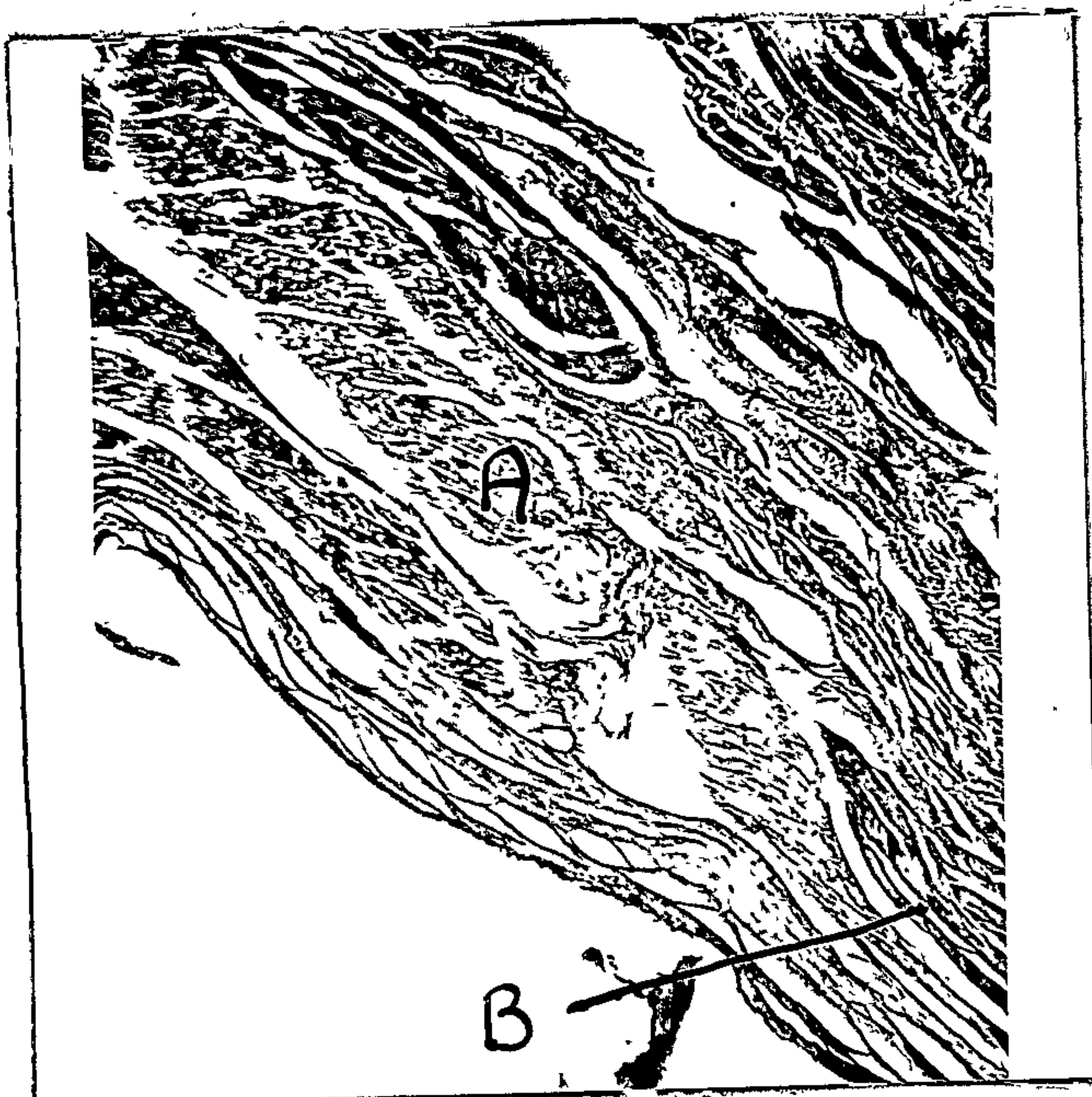


Fig. 114.

Insertion of the lateral pterygoid muscle into pes menisci.

(cf. Fig. 110.)

- A. Fibres of the lateral pterygoid muscle.
- B. Tendinous insertion into the pes menisci.

.....



Fig. 115.

Insertion of tendons in pes menisci. (X 270 cf. fig. 110.)

- A. Pes menisci.
- B. Tendons of lateral pterygoid muscle.

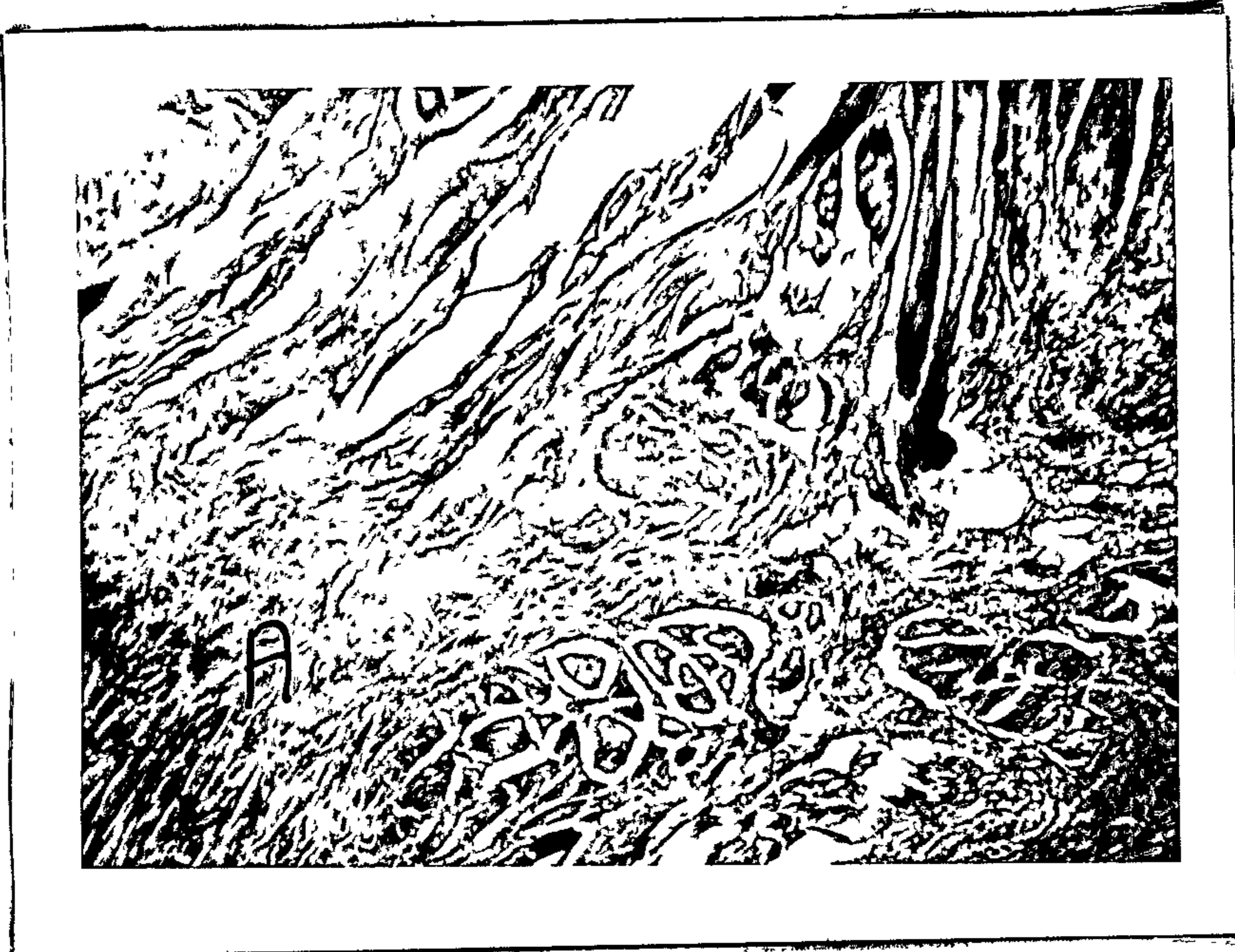


Fig. 116.

Detail of the pes menisci. (X 900 cf. fig. 110.)

- A. Hela of pes menisci.



Fig. 117.

Demonstrating cells of the pes menisci. (X 900 cf. fig. 110.)

A. Elongated fibroblasts.

Note: The relatively orientated collagenous fibres.

.....

Pars Gracilis Menisci. (cf. fig. 110.)

The pars gracilis menisci in this section has a ligamentous appearance and the main cell component is elongated fibroblasts located between wavy collagenous fibres. Sub synovial connective tissue is conspicuous by its absence both in the pes menisci and the pars gracilis menisci. (figs. 118, 119, 120.)

The synovial membrane consists usually of a layer of elongated fibroblasts. Blood vessels occupy canals in the centre of the pars gracilis menisci and their structure will be discussed infra. (figs. 121, 122.)

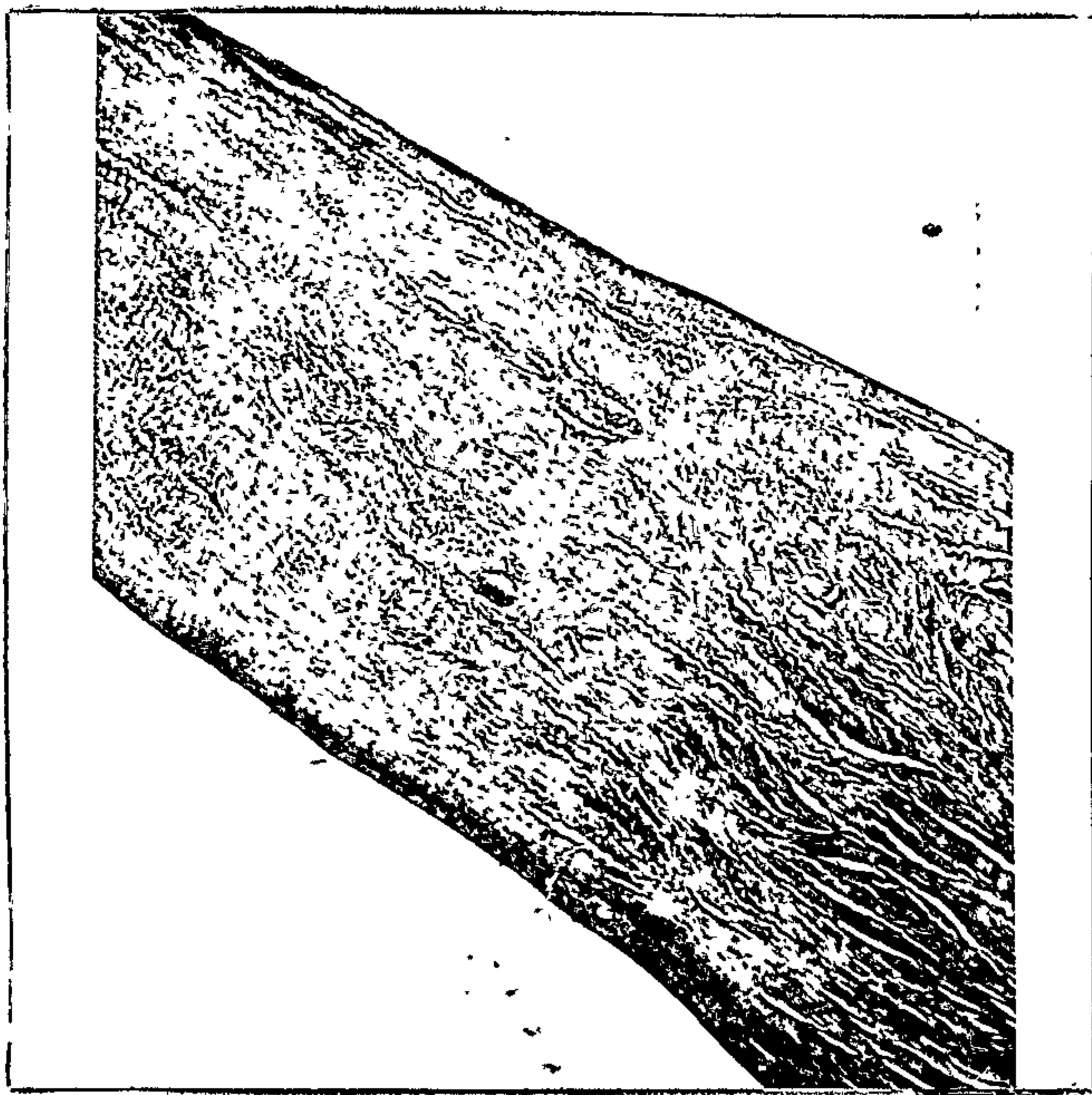


Fig. 118.

Pars gracilis menisci. (X 80 cf. fig. 110.)

.....



Fig. 119.

cellular component in the central part of the pars gracilis
menisci. (X 900 cf. figs. 110, 118.) Cells are elongated
fibroblasts lying between bands of collagenous fibres.

.....



Fig. 120.

Peripheral part of the pars gracilis menisci. (X 900 cf. figs. 110, 118.) Peripheral cells are elongated flattened fibroblasts widely spaced.

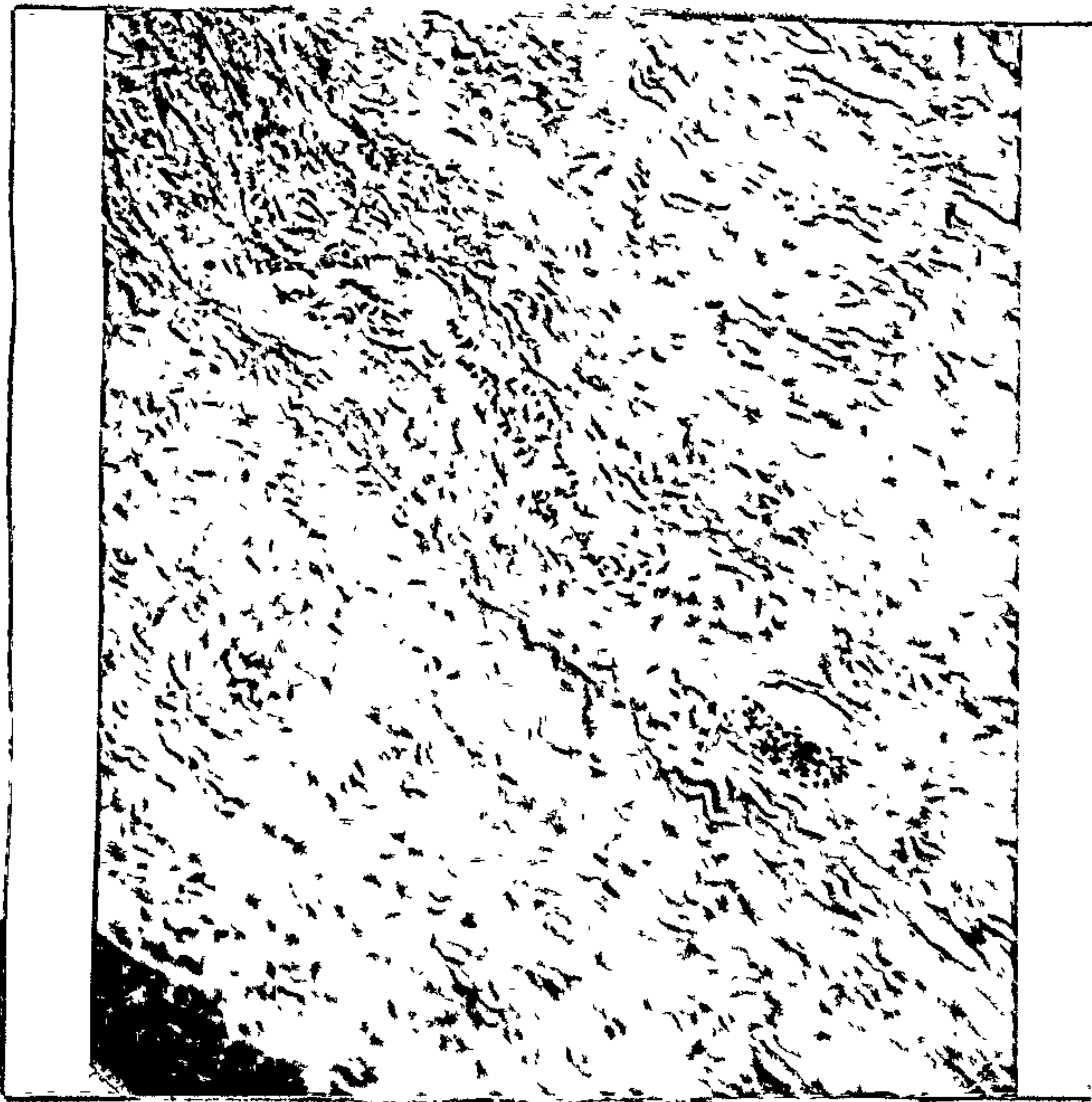


Fig. 121.

Blood vessels in the pars gracilis menisci. (X 270 cf. figs. 110, 118.)



Fig. 122.

Blood vessels in the pars gracilis menisci. (X 900 of. figs. 110, 118, 121.)

- A. Vein.
- B. Arteriole.

Pars Posterior Menisci. (Cf. Fig. 110.)

The region of the pars posterior menisci, again, has a ligamentous appearance. The main cellular component being fibroblasts, although chondrocytes are frequently seen.

(figs. 123, 124.)



Fig. 123.

Central part of the pars posterior menisci. (X 900 of. fig. 110.) Notes: Some of the cells are fibroblastic in nature, others are of a chondrocytic nature.

- A. Cells of a chondrocytic nature.
- B. Cells of more fibroblastic nature.



Fig. 124.

Peripheral part of the pars posterior menisci. (X 900 cf. fig. 110.) The peripheral cells are elongated fibroblasts widely spaced.

Superior Stratum. (cf. fig. 110.)

The superior stratum consists of collagenous fibres and fairly thick elastic fibres orientated in the same plane, (figs. 125, 126.) A well defined synovial membrane 2 to 3 cell layers thick can be recognised above the superior stratum. Beneath this there is a vascular sub synovial connective tissue zone in which the connective tissue is fairly thick. (figs. 127, 128.)

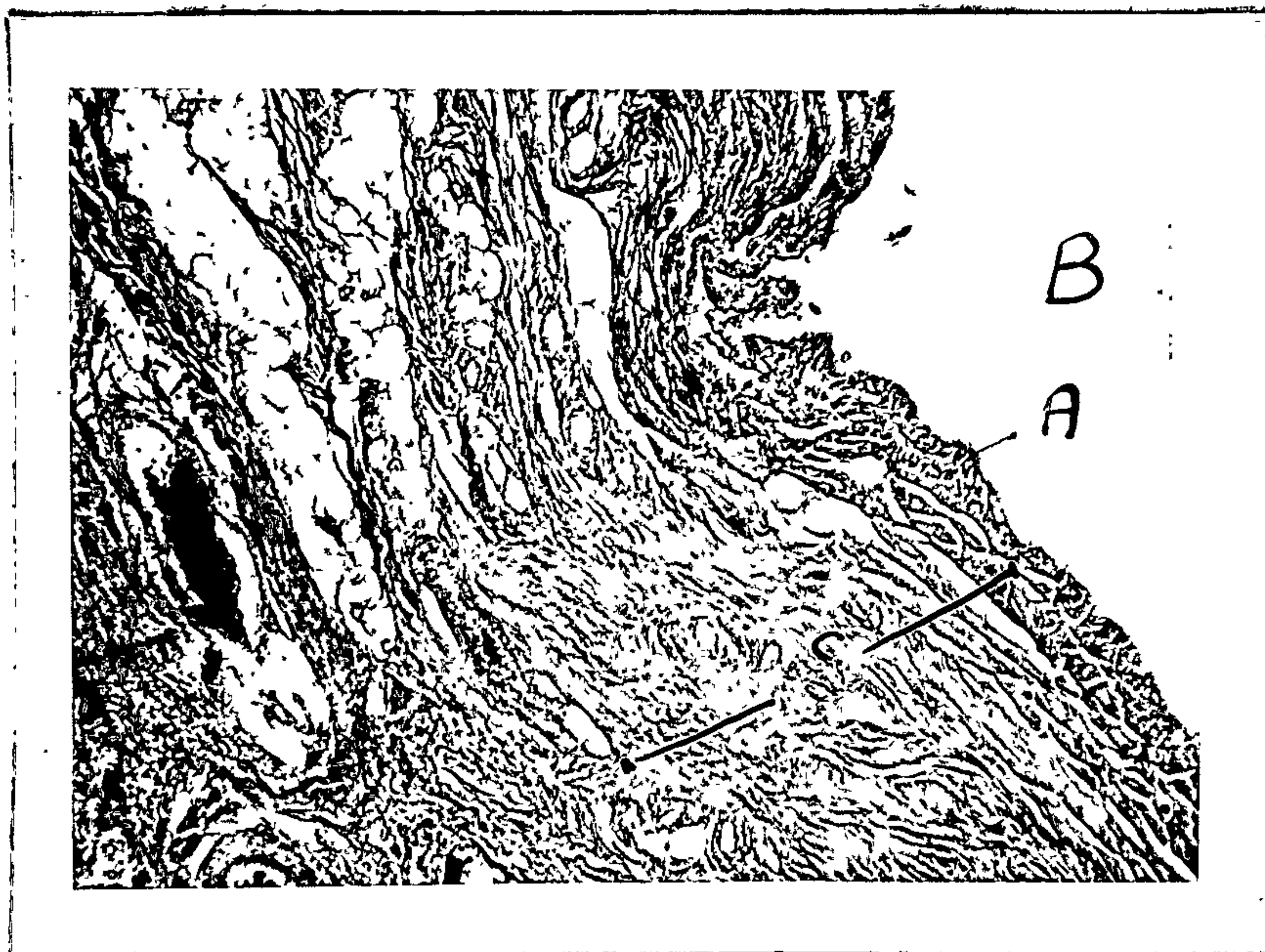


Fig. 125.

Superior Stratum. (X 80 cf. fig. 110.)

- A. Synovial membrane.
- B. Superior joint cavity.
- C. Superior stratum.

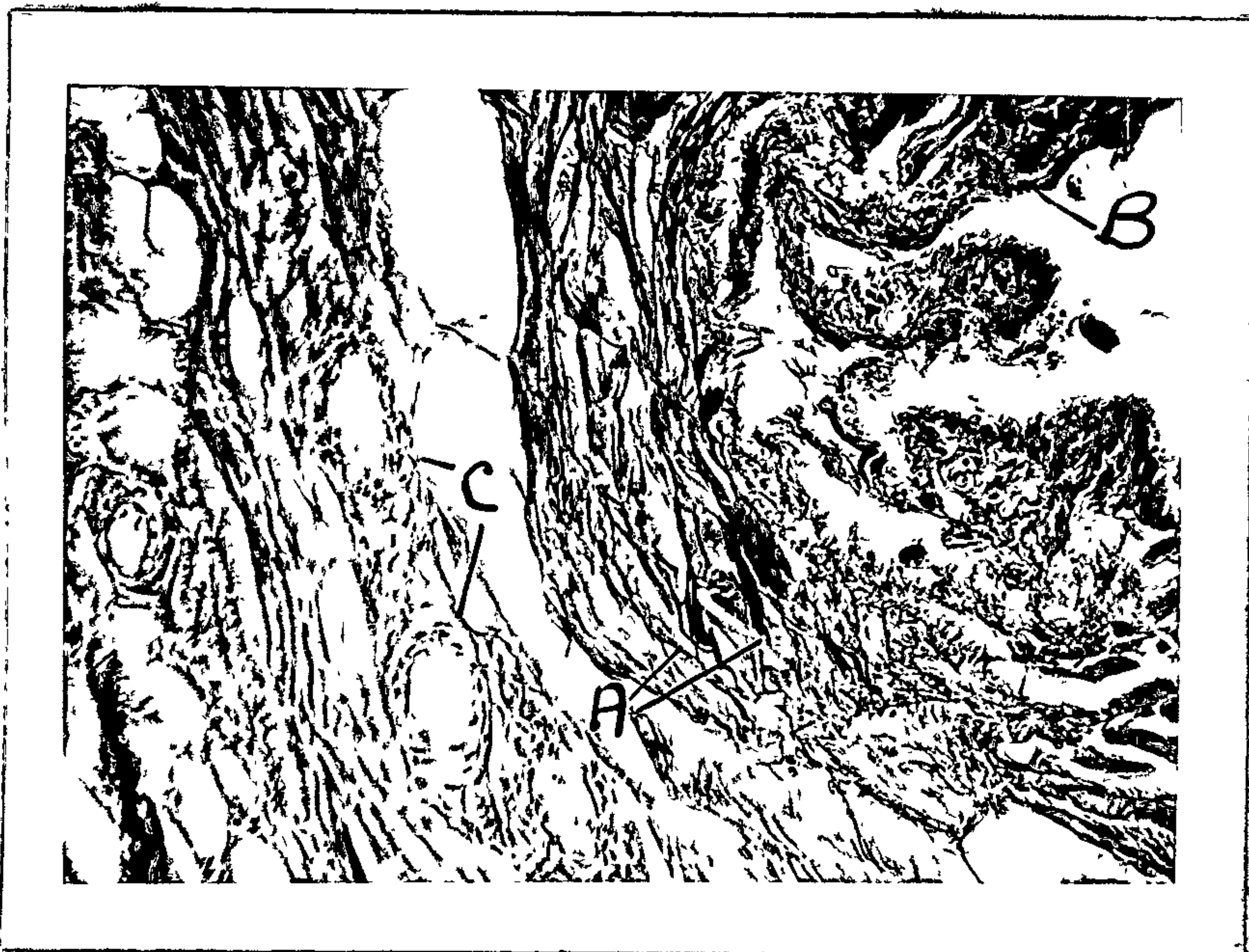


Fig. 126.

Superior stratum showing elastic fibre component. (X 270 cf. figs. 110, 125.) The elastic fibres appear to be orientated longitudinally.

- A. Elastic fibres.
- B. Synovial membrane.
- C. Blood vessels.

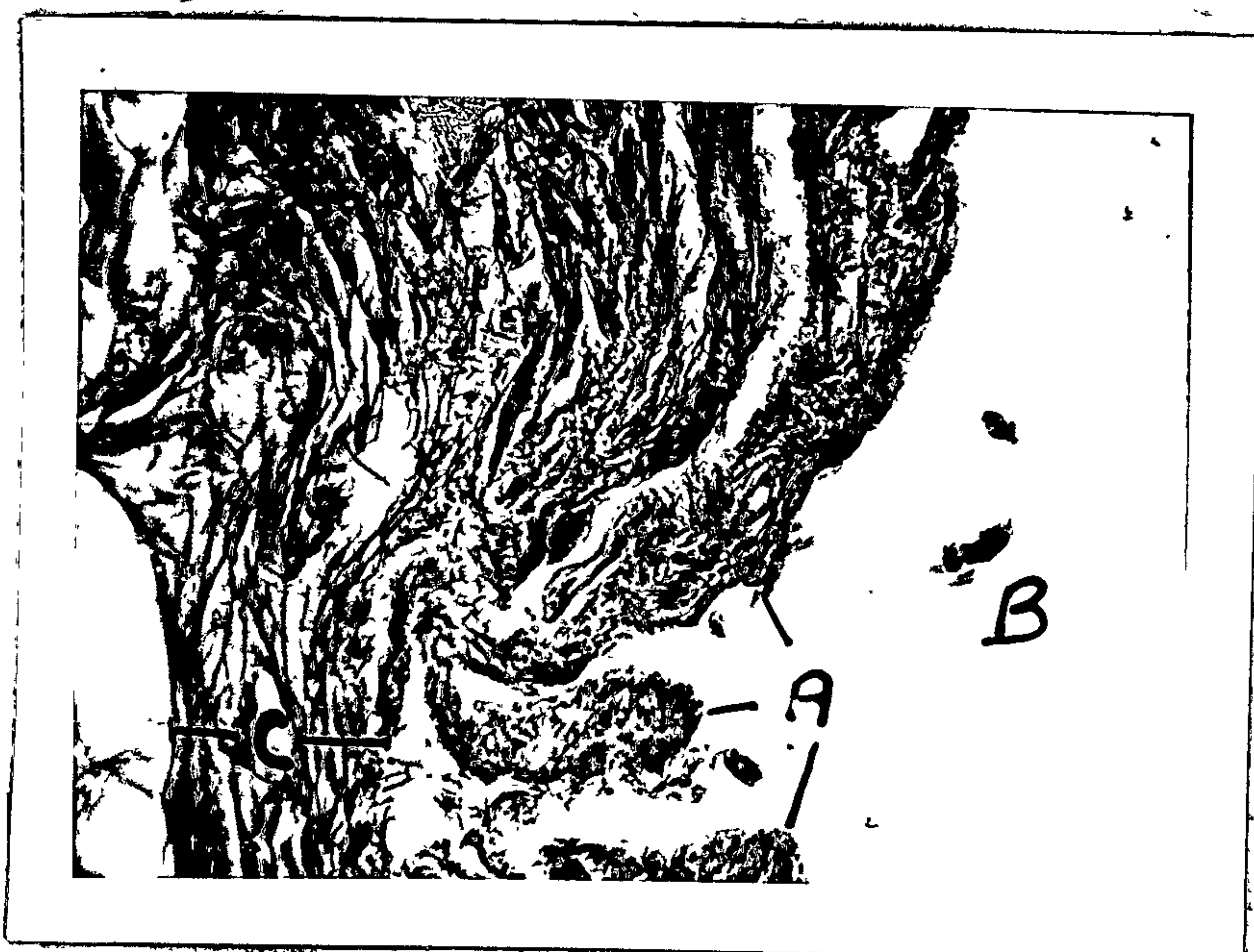


Fig. 127.

Synovial membrane above the superior stratum (X 80 of. Fig. 110.) Showing projection of synovial membrane into the superior joint cavity.

- A. Synovial membrane.
- B. Superior joint cavity.
- C. Superior stratum.



Fig. 128.

Synovial membrane above the superior stratum. (X 900 of. Figs. 110, 127.)

- A. Cell of synovial membrane 1 to 2 cells thick.
- B. Arterioles.

Inferior Stratum. (cf. fig. 110.)

The inferior stratum is ligamentous in nature similar to that previously described. (figs. 129, 130.) There is no sub synovial connective tissue zone apparent superficially to the inferior stratum and the synovial membrane consists of a layer of fibroblasts. At the junction of the inferior stratum to the fibrous covering of the head of the condyle, a long synovial villus extends into the inferior joint cavity. (figs. 131, 132, 133.)

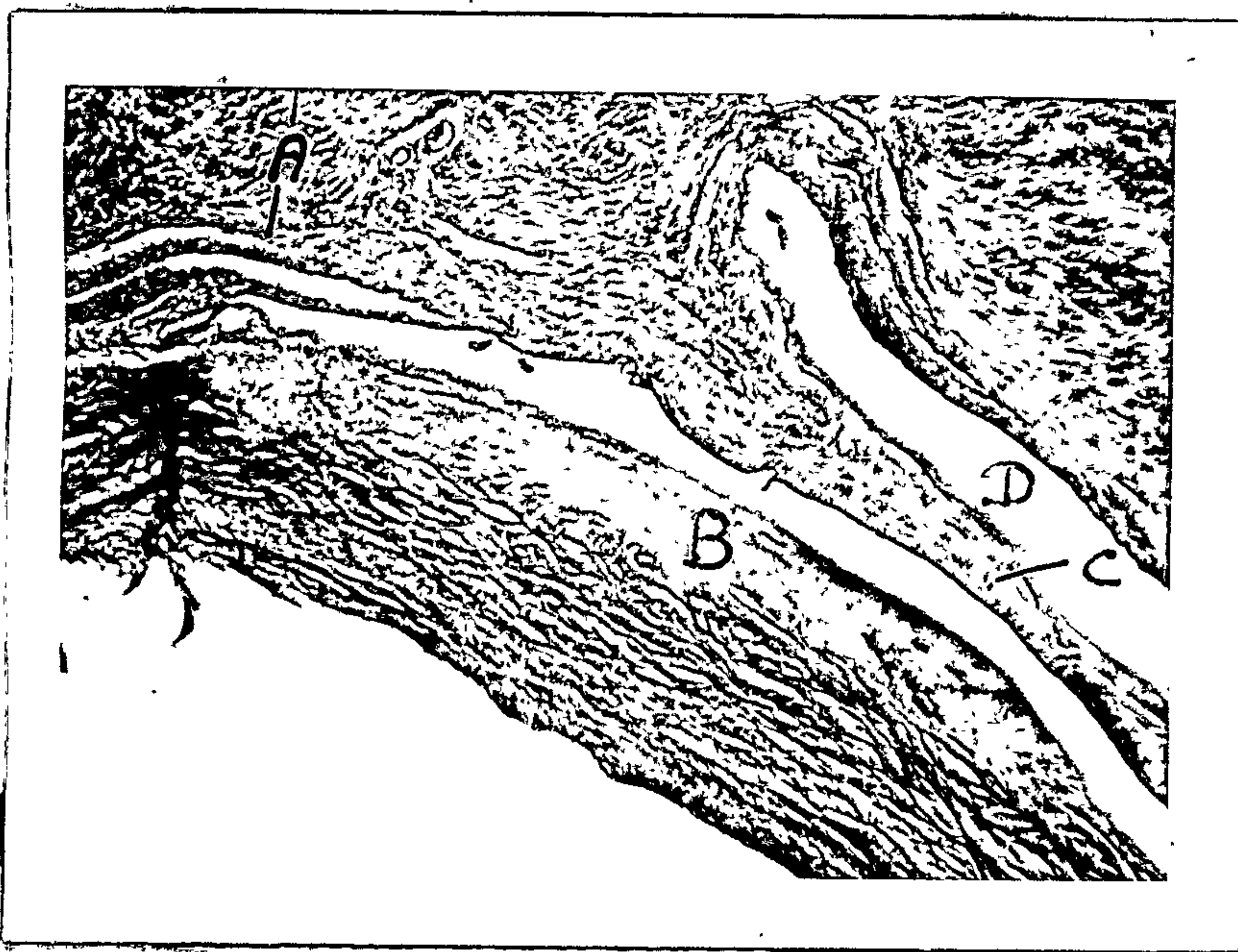


Fig. 129.

Inferior stratum (X 30 cf. fig. 110.)

- A. Inferior stratum.
- B. Perichondrium.
- C. Synovial villus.
- D. Postero-inferior joint cavity.

.....

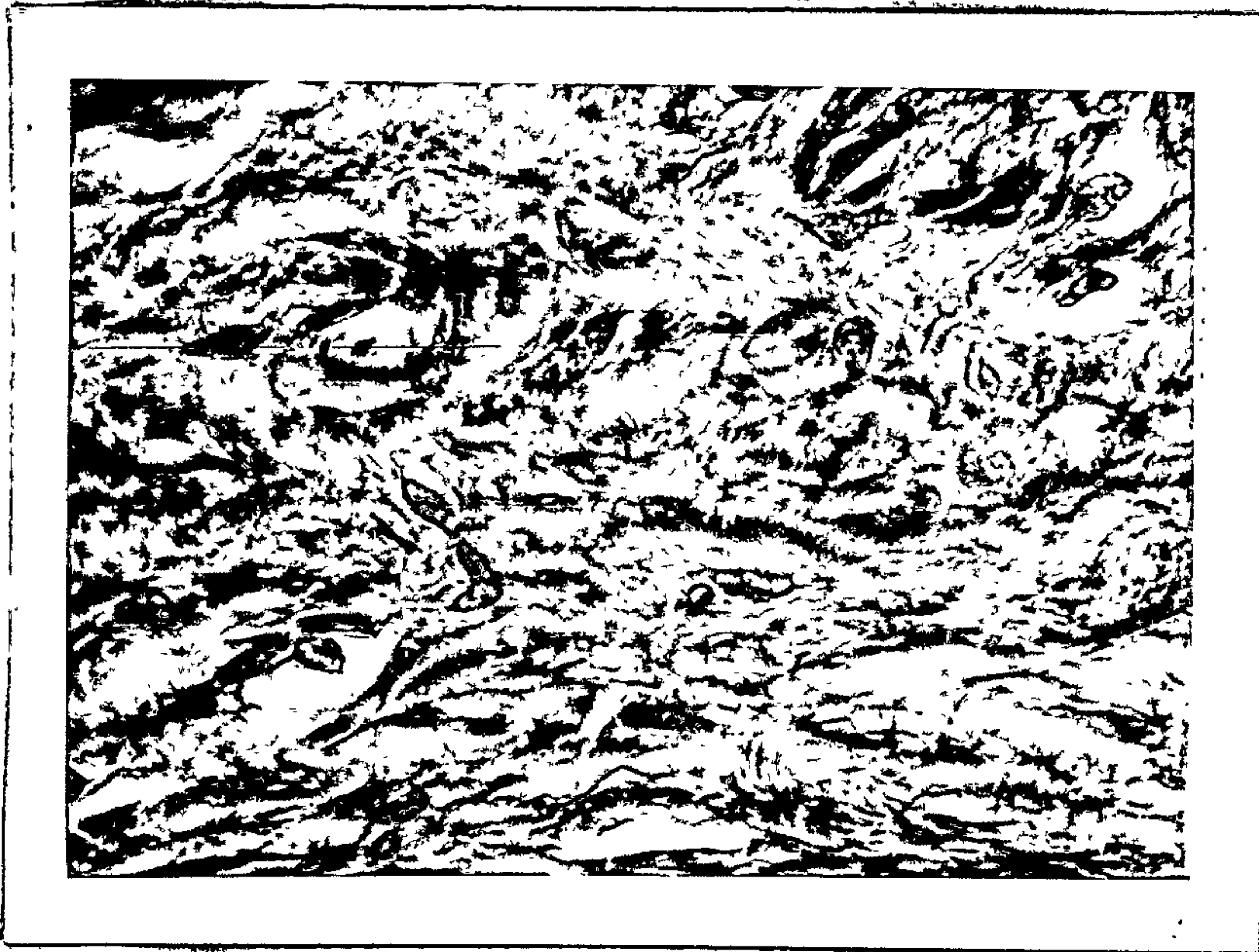


Fig. 130.

Cellular component of the inferior stratum. (X 900 cf. figs. 110, 129.) The cells appear to be fibroblastic in nature.

.....

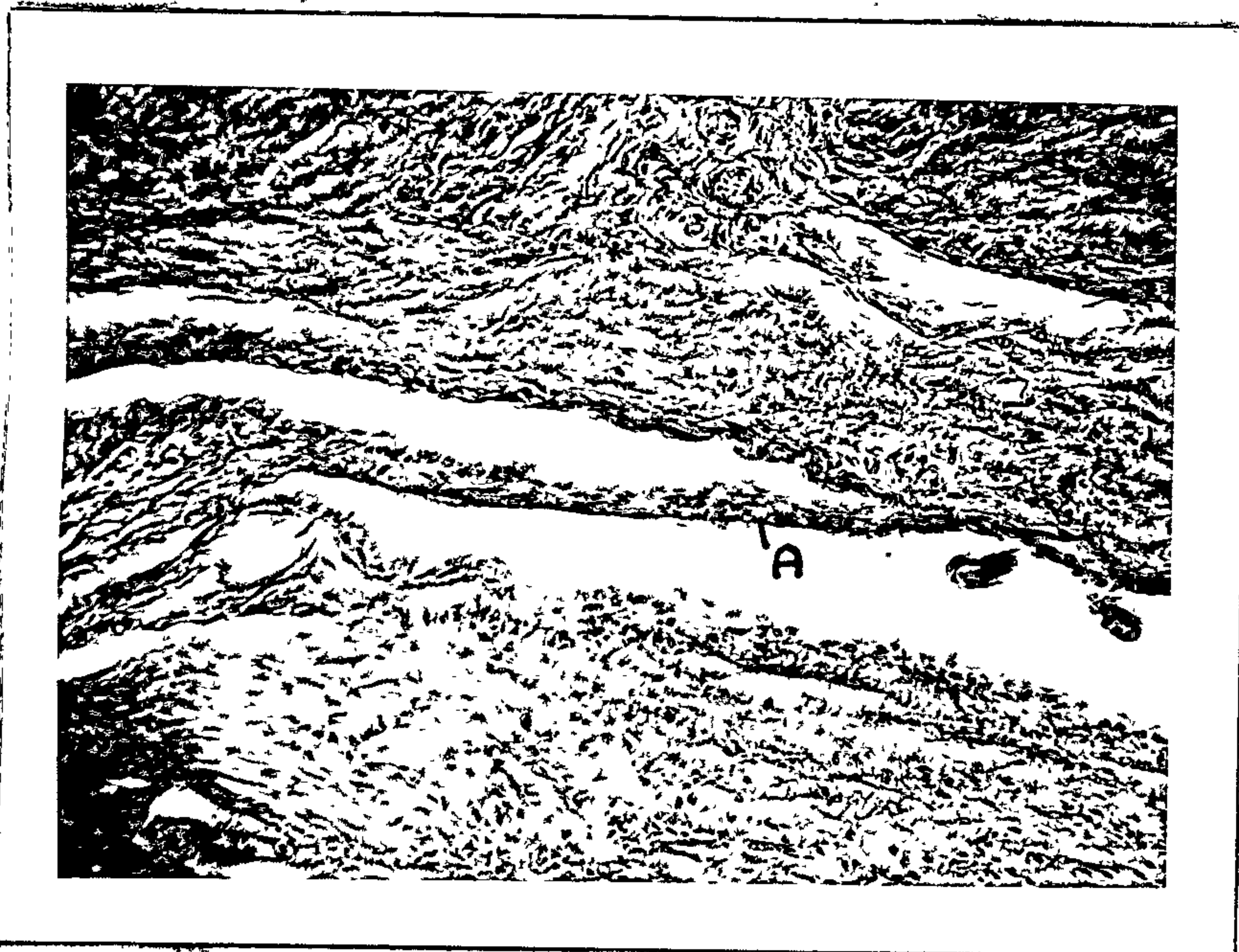


Fig. 131.

Inferior stratum showing a very thin villus projecting into the postero-inferior extremity of the inferior joint cavity. (X 270 cf. fig. 110.)

A. Villus.

.....

L

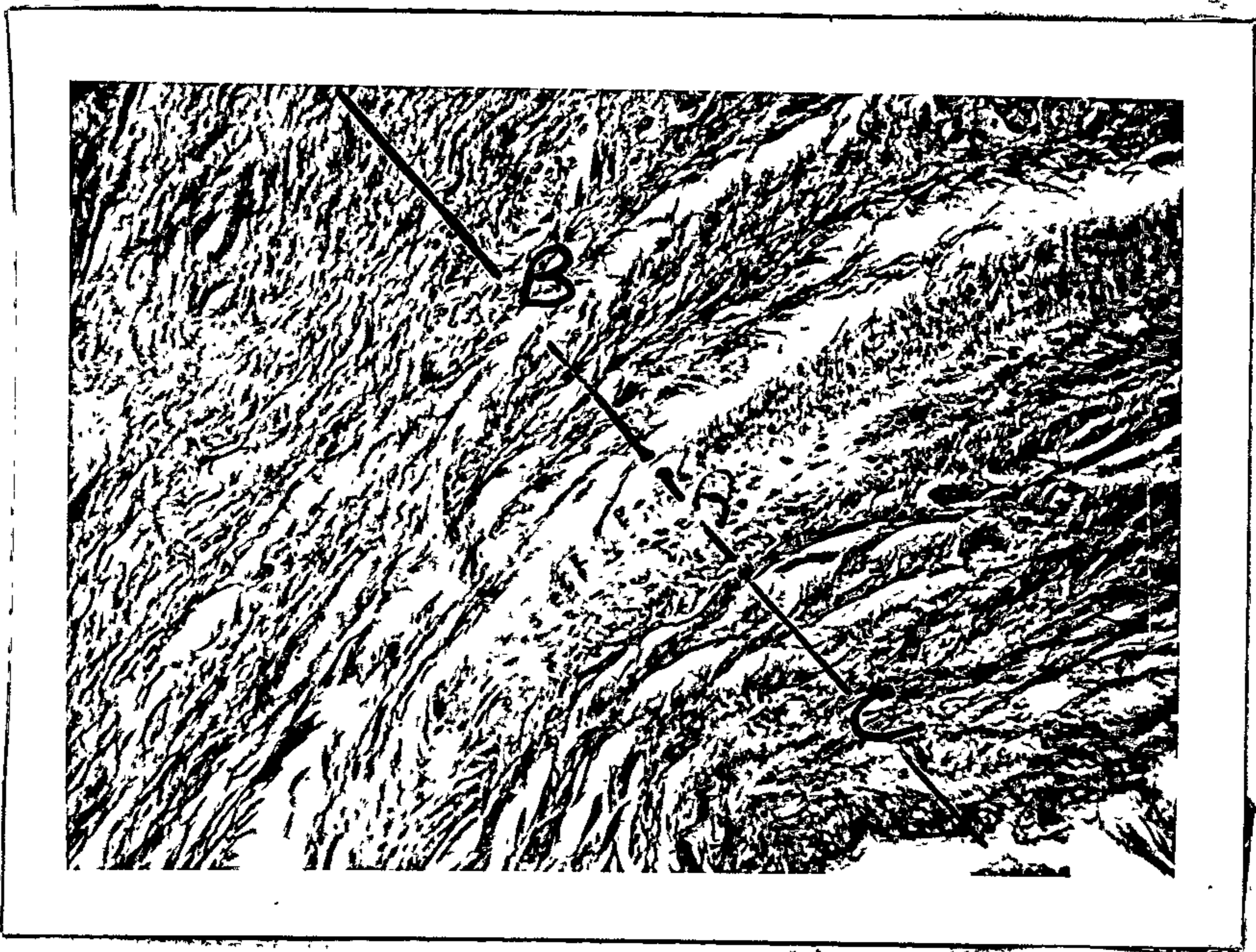


Fig. 132.

Attachment of the inferior stratum to the posterior aspect of the perichondrium of the condylar head. (X 270 cf. fig. 110.) Note the fibres of the inferior stratum merging with the perichondrium of the condyle and the chondrocytic nature of the cells intervening between inferior stratum and perichondrium.

- A. Layer of chondrocytic cells.
- B. Inferior stratum.
- C. Fibro-elastic layer of perichondrium.



Fig. 133.

Blood vessels in the inferior stratum. (X 900 cf. fig. 110.)

- A. Arteriole.
- B. Epitheloid type cell.
- C. Arteriole.

Bilaminar Zone. (cf. fig. 110.)

The bilaminar zone is not well demarcated in this section, and it merges imperceptibly into the pars posterior menisci. Thick walled veins can be seen just posterior to the pars posterior menisci (figs. 134, 135.) and more posteriorly, large thin walled veins are apparent, around which are fat cells. These are surrounded again by, and divided, as it were, into partitions by fibrous septa. (figs. 134, 135.)

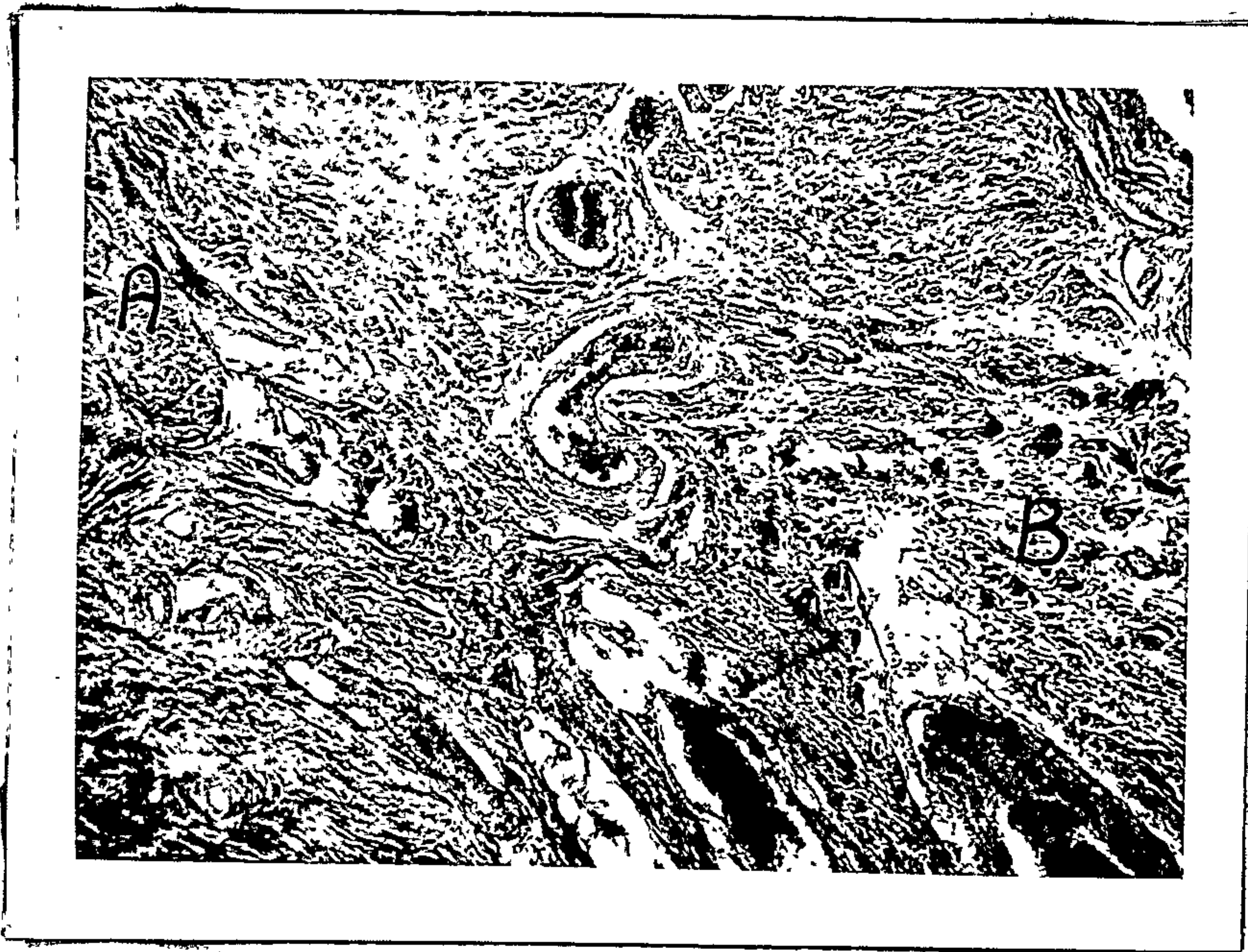


Fig. 134.

Apex of the bilaminar zone. (X 80 cf. fig. 110.)

- A. Pars posterior menisci.
- B. Bilaminar zone.

.....

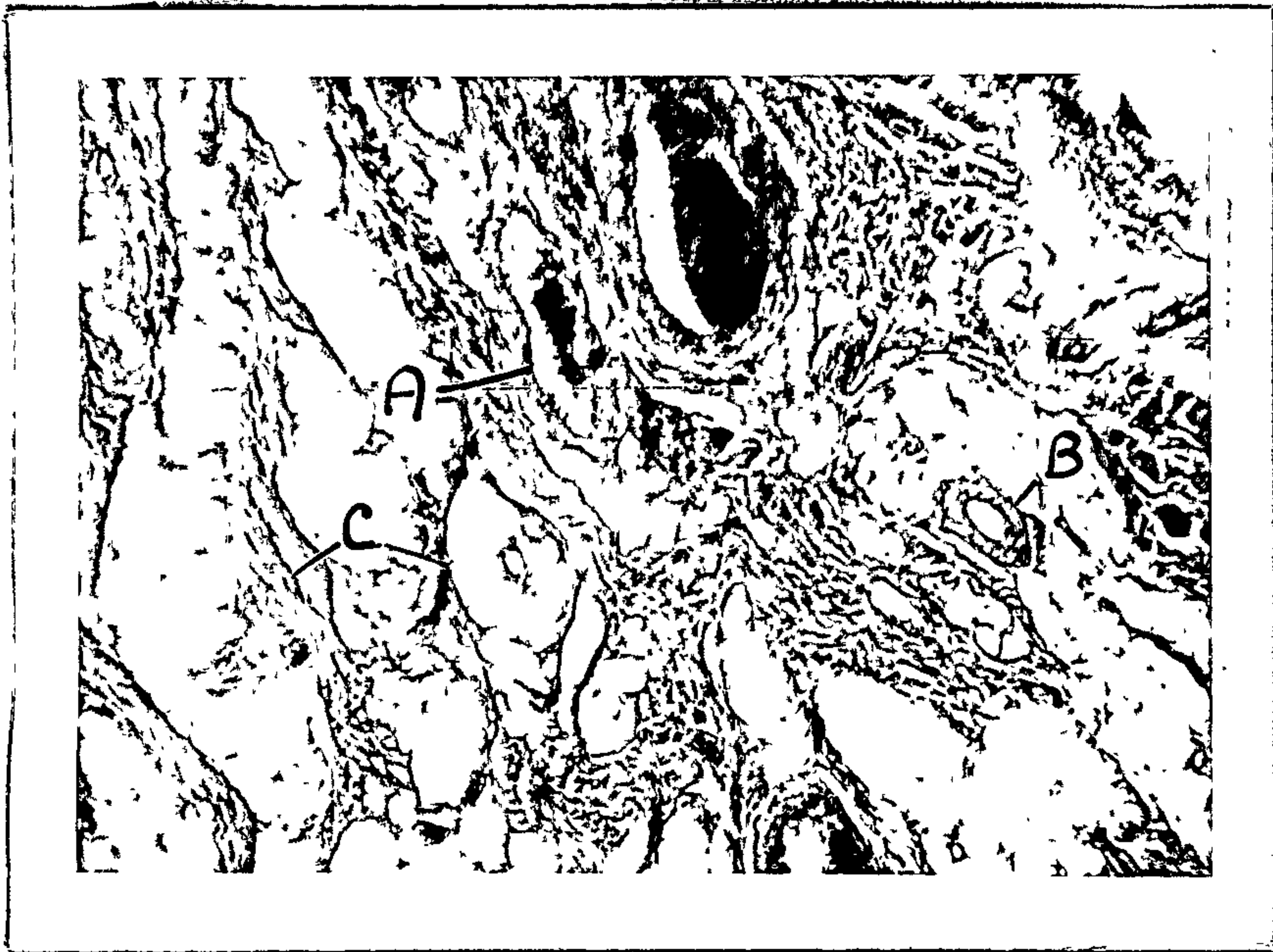


Fig. 135.

Blood vessels in the bilaminar zone. (X 270 cf. fig. 110.)

- A. Thin walled vein.
- B. Artery.
- C. Fibrous septa.

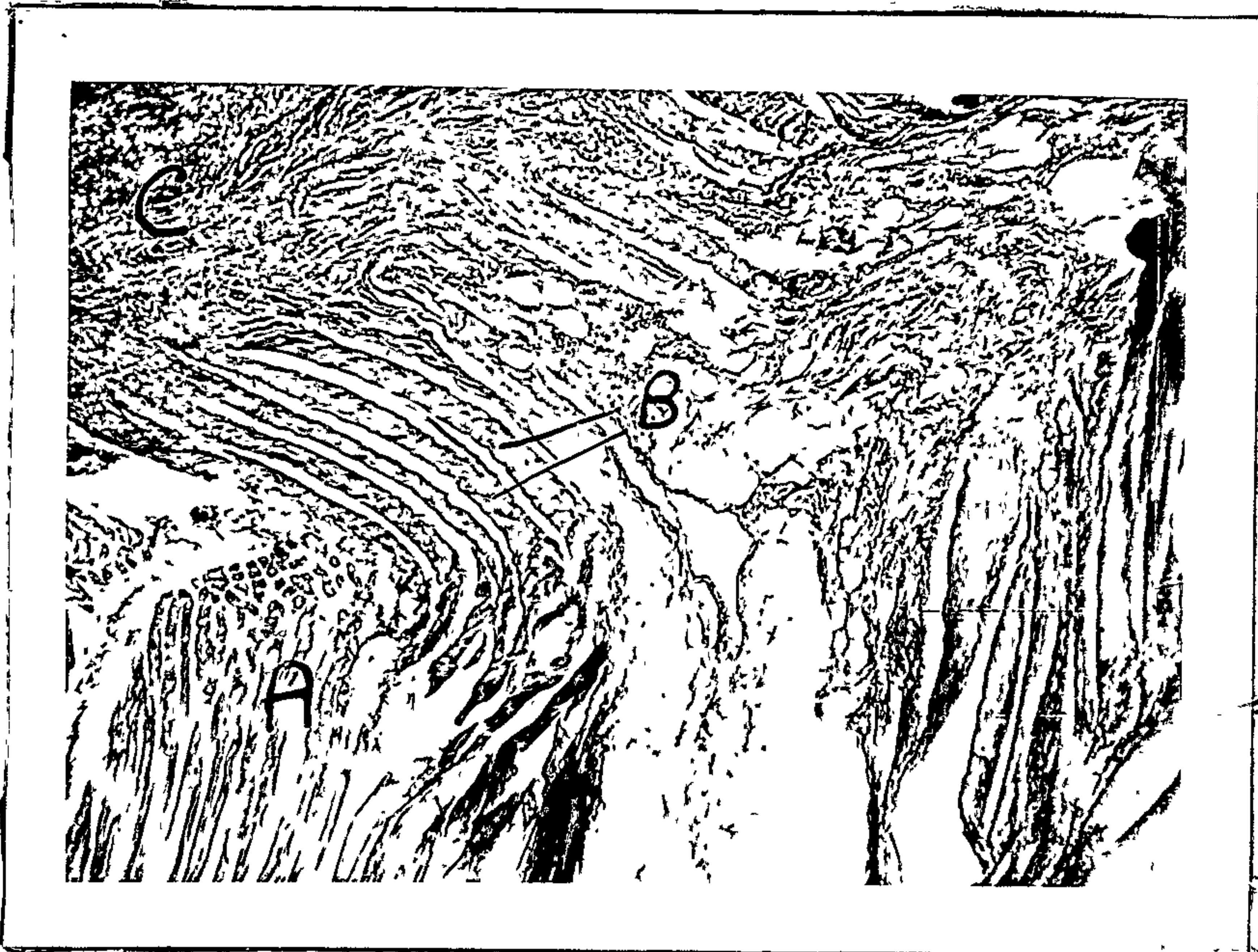


Fig. 136

Insertion of lateral pterygoid muscle into periosteum of the pterygoid fovea of the condyle. (X 80 cf. fig. 110.)

- A. Fibres of lateral pterygoid muscle.
- B. Tendons of lateral pterygoid muscle.
- C. Periosteum of the pterygoid fovea of the condyle.



Fig. 137.

Showing insertion of lateral pterygoid muscle into periosteum of condyle in greater detail. (X 270 cf. figs. 110, 136.)

- A. Tendons.
- B. Tendon space.
- C. Fibrous layer of periosteum.

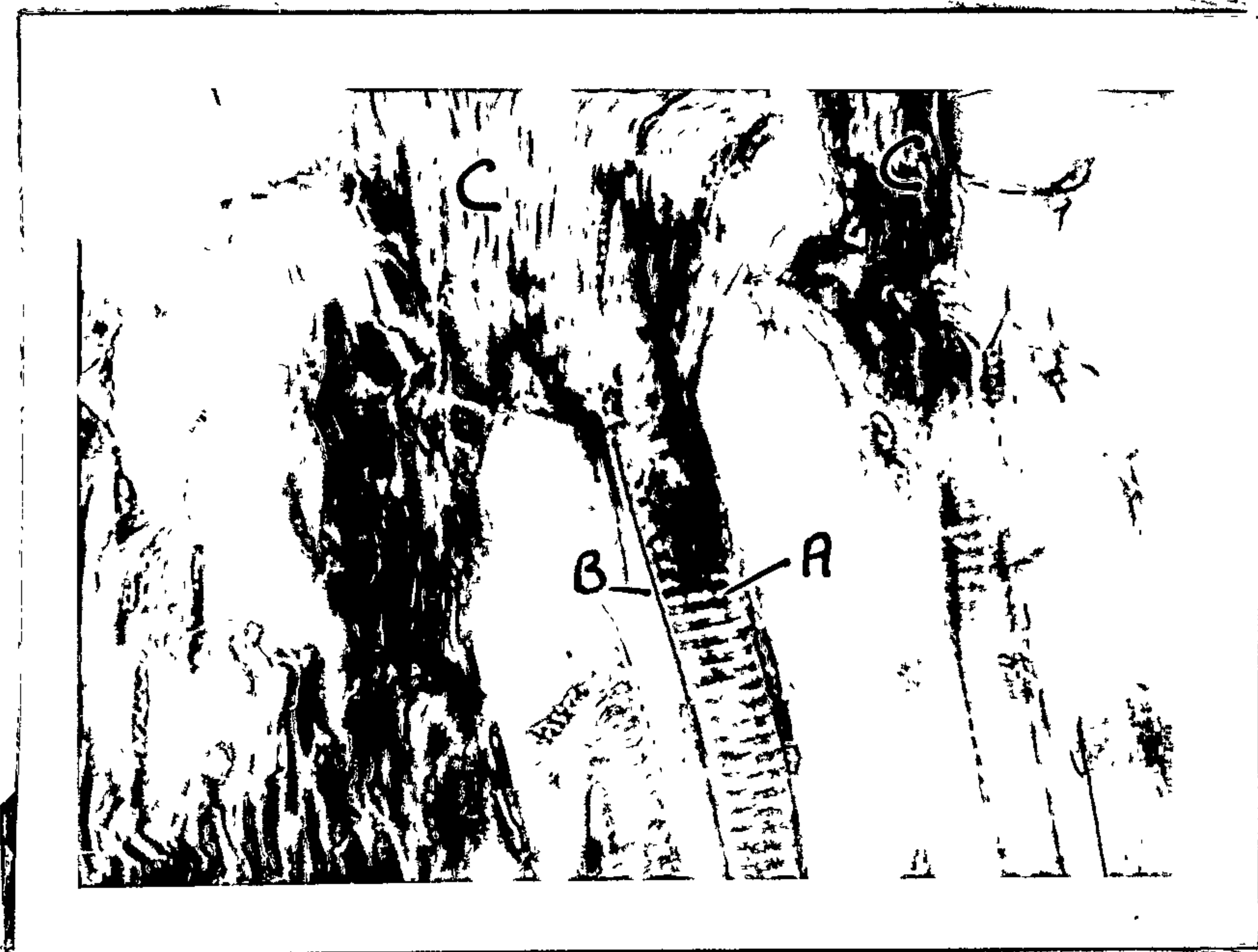


Fig. 138.

Musculo-tendinous junction of lateral pterygoid muscle. (X 900 cf. figs. 110, 136, 137.)

- A. Muscle fibres lateral pterygoid muscle.
- B. Sarcolemma.
- C. Tendons.

The sarcolemma of muscle fibres appears to become continuous with the collagenous fibres of the tendon.

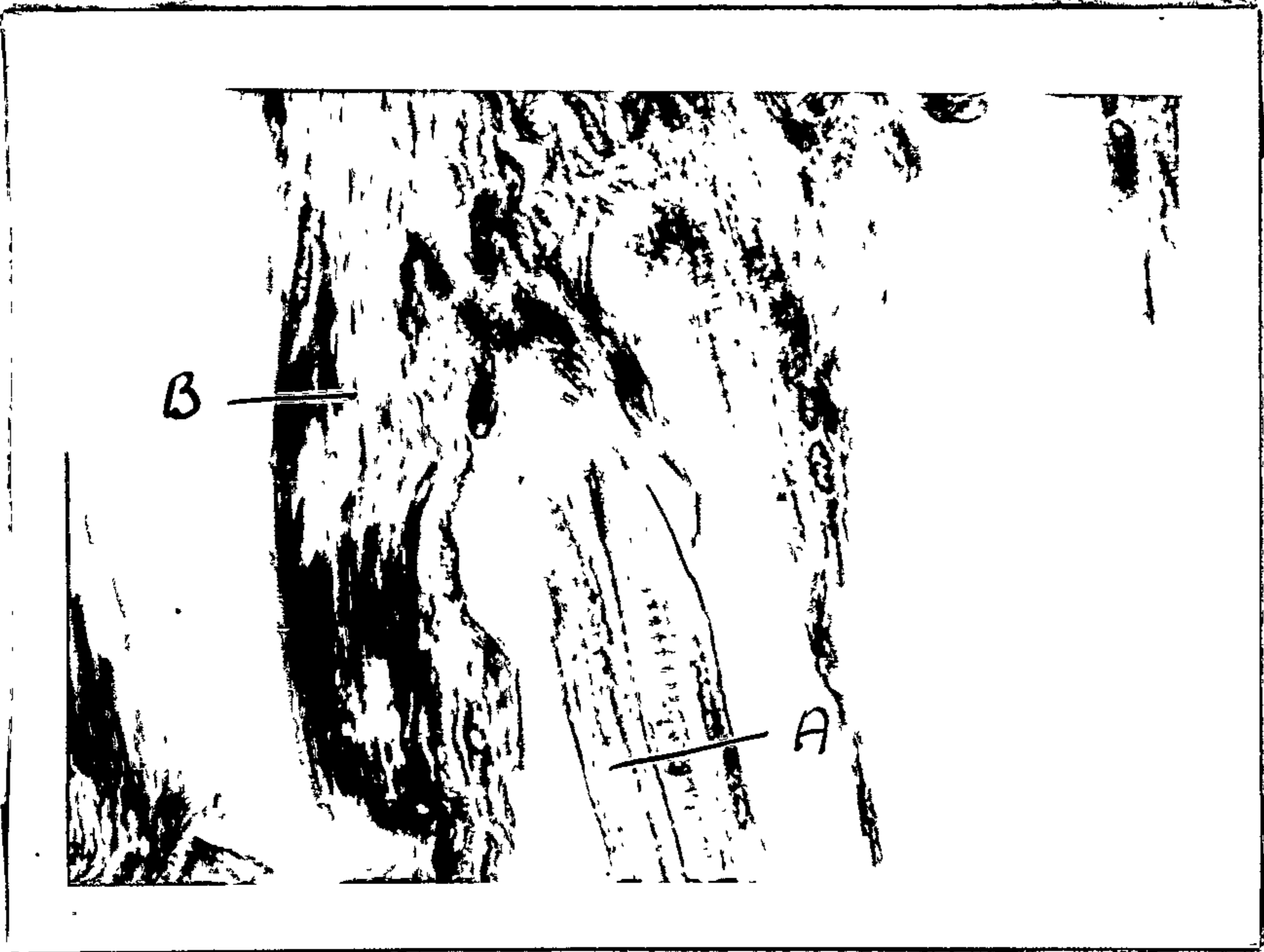


Fig. 139.

Musculo-tendinous junction of lateral pterygoid muscle showing the muscle fibres inserting into the tendon. (X 900 cf. figs. 110, 136, 137.)

- A. Muscle fibres with its cone shaped extremity appearing to fit in a groove in the tendon.
- B. Tendon.



Fig. 140.

Showing oblique junction of muscle fibres with a tendon. (X 900 cf. figs. 110, 136, 137.) The sarcolemma (A) appears to merge with the collagenous fibres of the tendon.

Middle third of the Temporomandibular Meniscus. (cf. fig. 141.)

The same parts of the disc are recognisable in this section. The important exception is that the chondrocytic nature of the pars gracilis menisci and pars posterior menisci is clearly apparent.

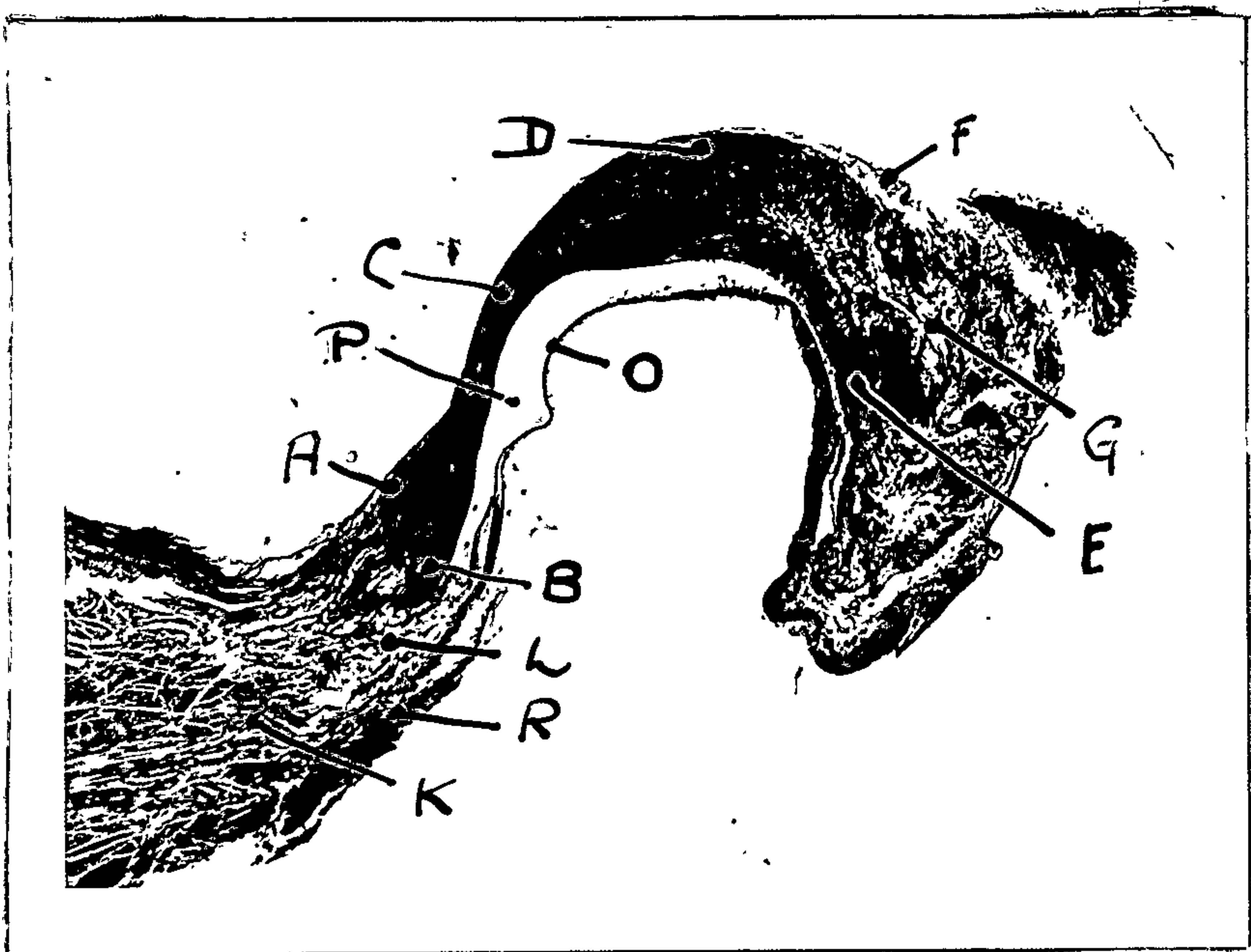


Fig. 141.

Specimen no. 2 - 19 months.

Sagittal section X 5 middle third temporomandibular meniscus.

Note hela of pes menisci more prominent.

- A. Pes menisci.
- B. Hela of pes menisci.
- C. Pars gracilis menisci.
- D. Pars posterior menisci.
- E. Inferior stratum.
- F. Superior stratum.
- G. Bilaminar zone.
- H. Lateral pterygoid muscle.
- I. Pterygo-condylar area.
- J. Perichondrium.
- K. Inferior joint cavity.
- L. Periosteum.

.....

Pars Gracilis Menisci. (cf. fig. 141.)

In the pars gracilis menisci the main cell component is chondrocytes which lie in definite lacunae and the ground substance around them stain similarly to that of cartilage matrix. (fig. 142.)

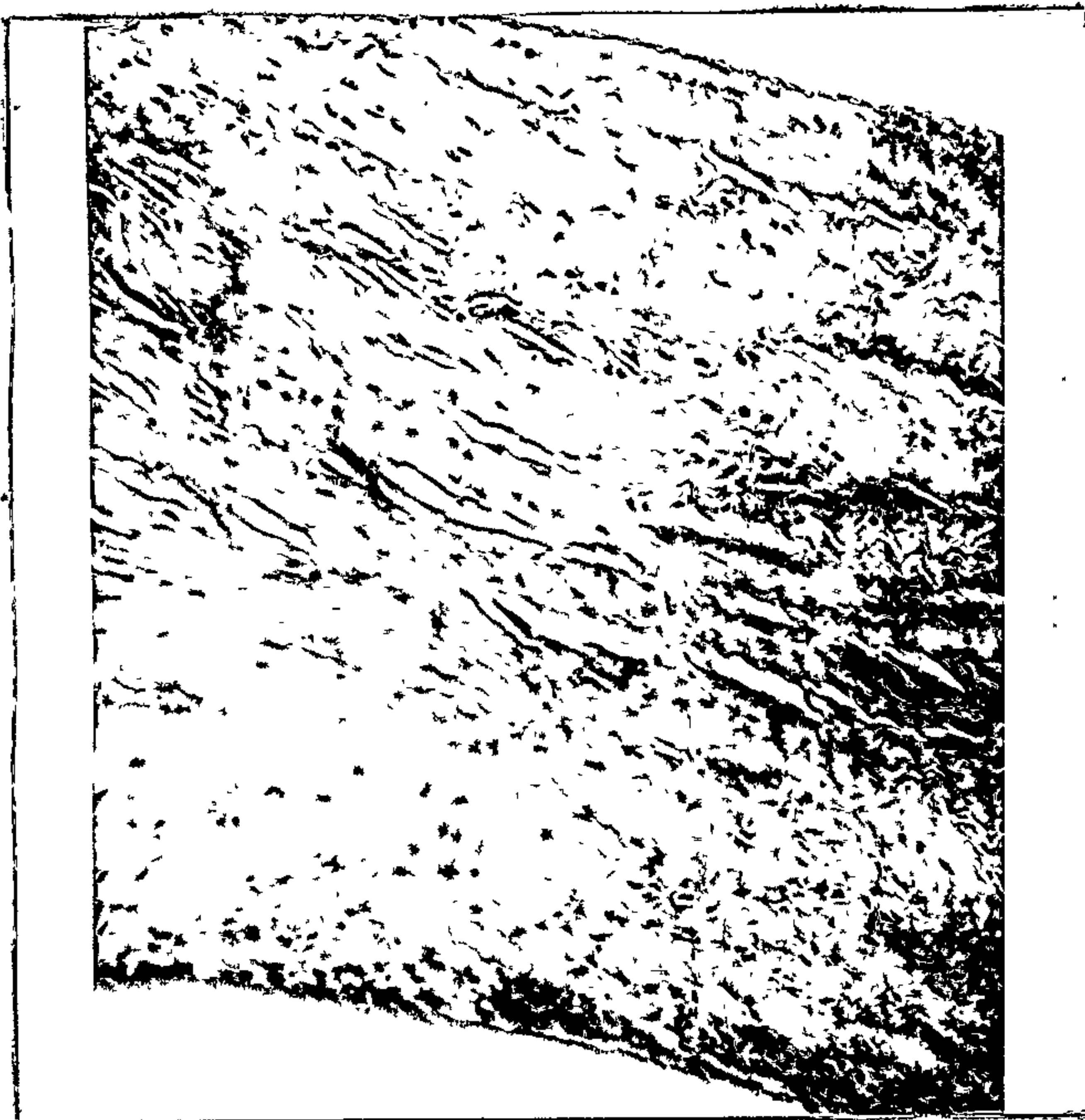


Fig. 142.

Pars gracilis menisci. (X 270 cf. fig. 141.)

Note: Majority of cells definitely chondrocytic in nature.

.....
Pars Posterior Menisci. (cf. fig. 141.)

The pars posterior menisci has essentially the same appearance as the pars gracilis menisci, except that the collagenous fibres are unorientated. (figs. 143, 144.)

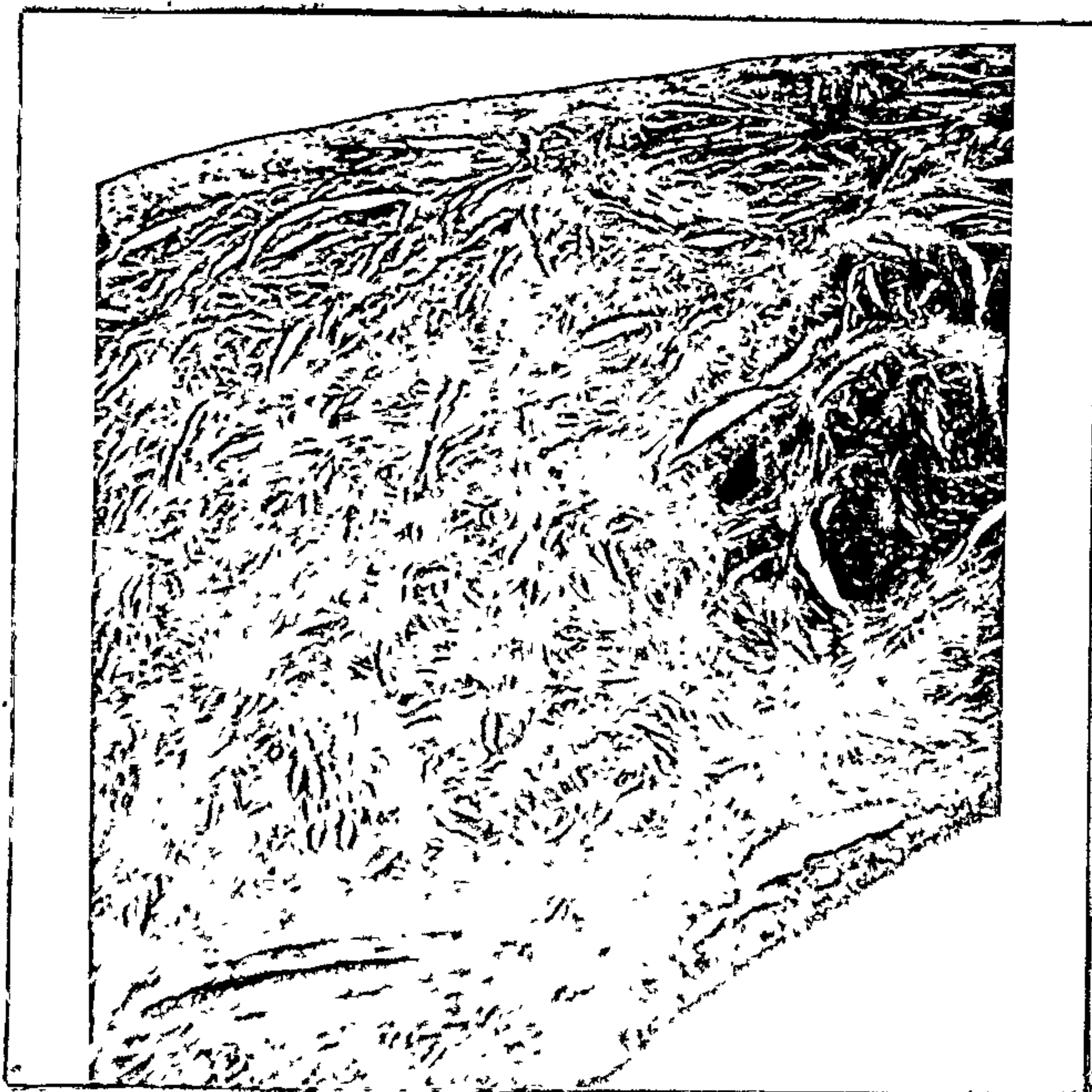


Fig. 143.

Pars posterior menisci. (X 80 cf. fig. 141.) Showing unorientated collagenous fibres.

.....



Fig. 144.

Cellular component pars posterior menisci. (X 900 cf. figs. 141, 143.) Note: Chondrocytic nature of the cells.

.....
Superior Stratum. (cf. fig. 141.)

The superior stratum consists of collagenous fibres in this part of the disc and the elastic fibres are oparse. (fig. 145.)

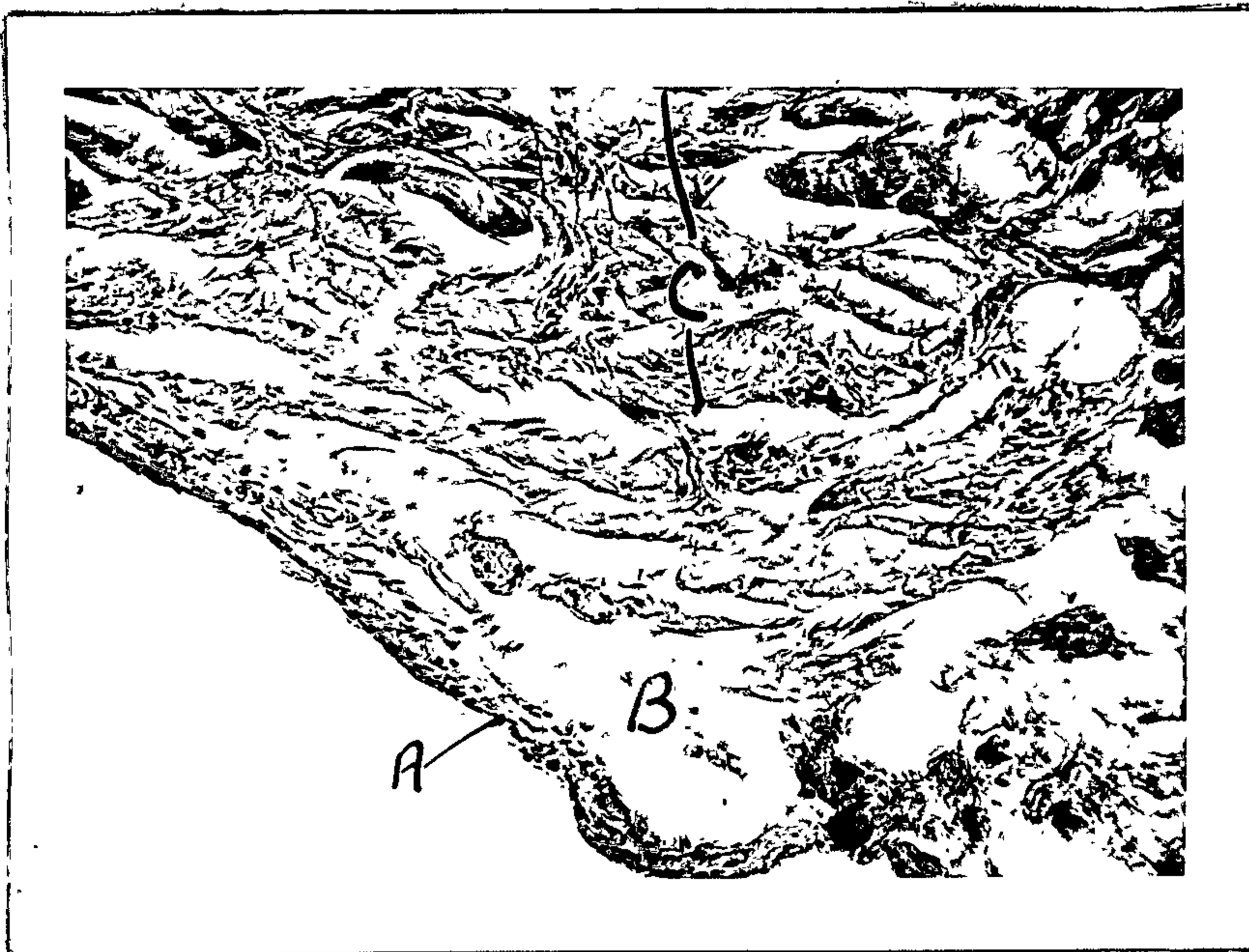


Fig. 145.

Superior stratum. (X 270 cf. fig. 141.)

- A. Synovial membrane.
- B. Loose connective tissue.
- C. Superior stratum.

.....
Medial third of the temporomandibular meniscus. (cf. fig. 146.)

Sub synovial connective tissue is confined to the anterior aspect of the head of the pes menisci. At the

anterio-inferior joint cavity there is a reflection of synovial membrane on to the perichondrium of the anterior articular slope of the head of the condyle. Sub synovial connective tissue is also present over the superior stratum and beneath the posterior part of the inferior stratum (figs. 147, 148, 149.) Elastic fibres are conspicuous in the superior stratum. (figs. 145, 147, 148, 149, 150.)

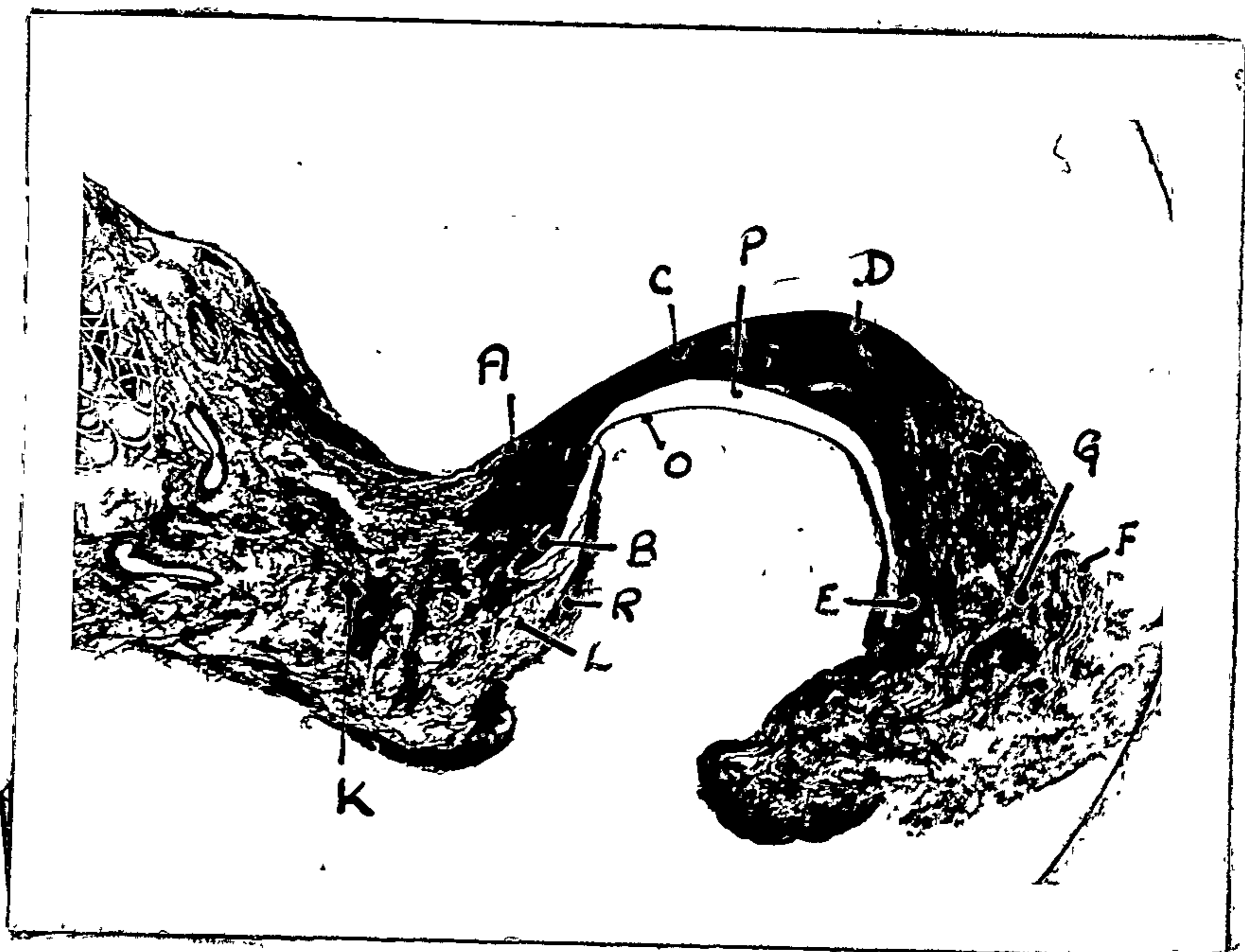


Fig. 146.

Specimen no. 2 - 19 months.

Sagittal section X 5, medial third temporomandibular meniscus.

- A. Pes menisci.
- B. Hela of the pes menisci.
- C. Pars gracilis menisci.
- D. Pars posterior menisci.
- E. Inferior stratum.
- F. Superior stratum.
- G. Bilaminar zone.
- K. Lateral pterygoid muscle.
- L. Pterygo-condylar area.
- O. Perichondrium.
- P. Inferior joint cavity.
- R. Periosteum.

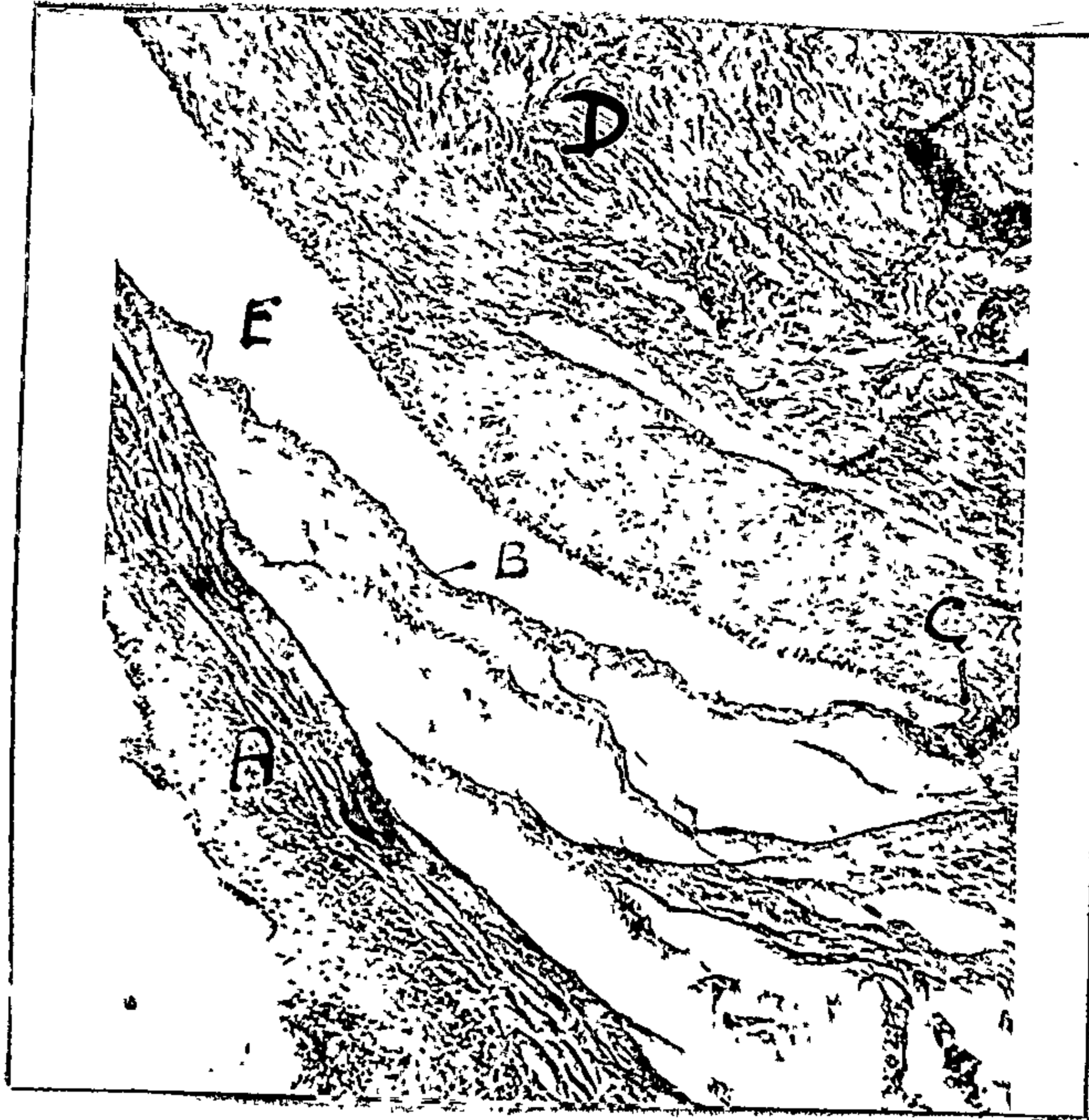


Fig. 147.

Reflection of synovial membrane on to perichondrium antero-inferior joint cavity. (X 80 cf. fig. 146.)

- A. Perichondrium.
- B. Synovial membrane.
- C. Reflection of synovial membrane beneath head of pes menisci.
- D. Head of pes menisci.
- E. Antero-inferior joint cavity.



Fig. 148.

Reflection of synovial membrane on to perichondrium antero-inferior joint cavity. (X 270 cf. figs. 146, 147.)



Fig. 149.

Synovial membrane beneath the head of pes menisci. (X 900 cf. fig. 146.)

Note: Cells of synovial membrane 1 to 3 cells thick.

A. Inferior joint compartment.

.....



Fig. 150.

Elastic fibres of the superior stratum. (X 900 cf. fig. 146.)

Note: Thick elastic fibres.

.....

Sinu Vasculosis Menisci.

A similar vascular canal can be seen in approximately the middle of the meniscus. (figs. 151, 152.) It is surrounded by definite fibro cartilage and proceeds to the inferior surface of the meniscus. This part of the meniscus is comprised of the most anterior extension of the synovial

membrane underlying the inferior stratum of the bilaminar zone which constitutes the genu. Blood vessels in the canal are arteries, arterioles, veins and epithelioid cell type, arterio-venous-anastomoses can be observed in the sub synovial connective tissue in this area (fig. 153.)

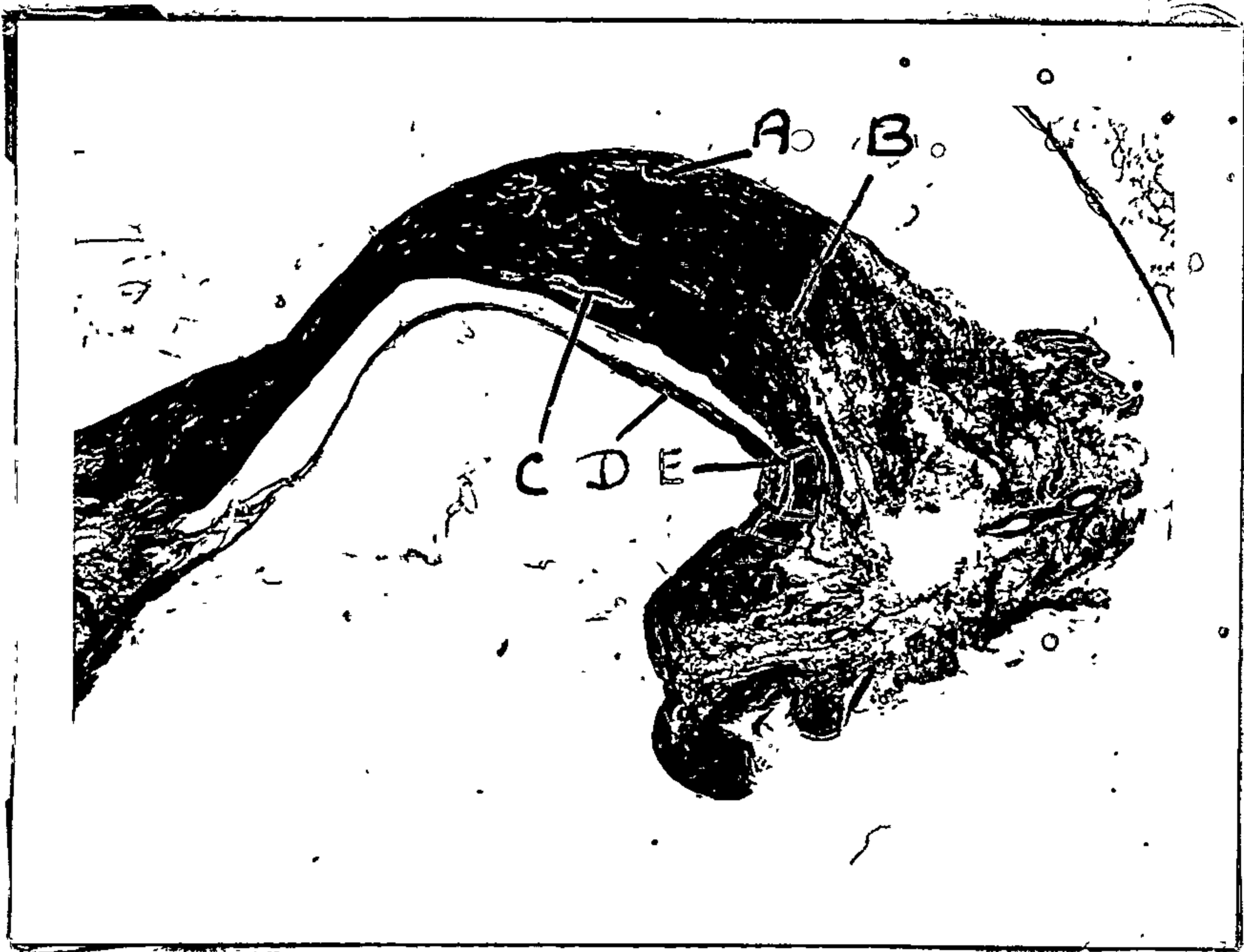


Fig. 151.

Specimen no. 2 - 19 months.

Sagittal section X 10 from the middle third of the temporomandibular meniscus showing position of genu vasculosis menisci.

- A. Pars Posterior Menisci.
- B. Apex of Bilaminar Zone.
- C. Inferior extremity of genu vasculosis menisci.
- D. Perichondrium.
- E. Junction of inferior stratum with perichondrium.

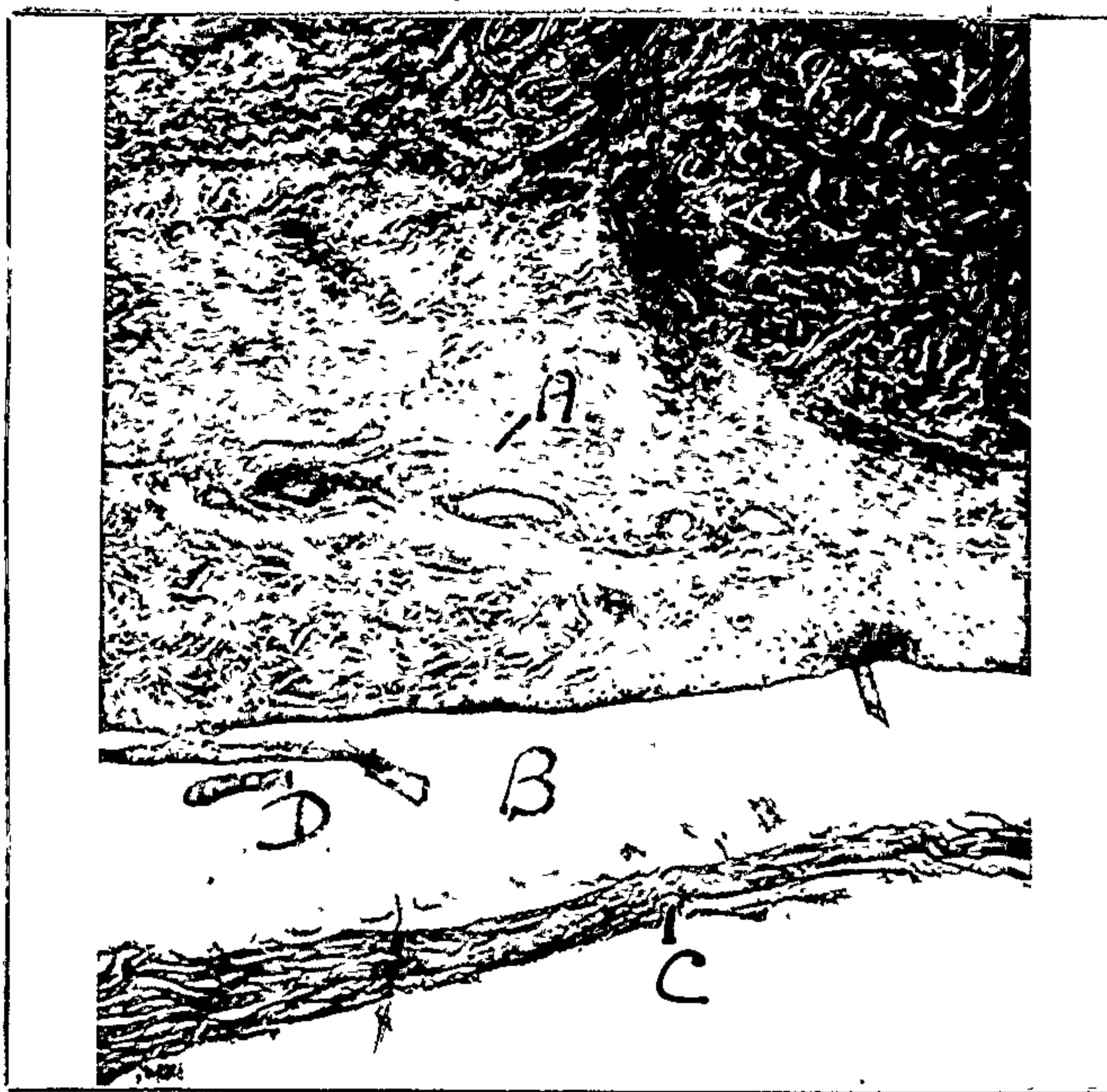


Fig. 152.

Blood vessels of the genu vasculosis menisci. (X 80 of. fig. 151.)

- A. Blood vessels.
- B. Inferior joint cavity.
- C. Perichondrium.
- D. Synovial villus.



Fig. 153.

Specialised blood vessels of the genu vasculosis menisci.
(X 900 of. fig. 151.)

- A. Artery.
- B. Vein.
- C. Epithelioid type arterio-venous-anastomoses.

SUMMARY.

In this specimen the chondrocytic nature of the pars gracilis menisci and the pars posterior menisci in the middle and the medial third of the disc is confirmed. The elastic

tissue associated with the superior stratum is notable in the medial and lateral third's but not in the middle third.

Vascular sub synovial connective tissue is confined as far as the inferior joint cavity is concerned to the inferior surface of the hila of the pes menisci and to the postero-inferior surface of the inferior stratum. It is also associated with the superior surface of the superior stratum.

The main orientation of the collagenous fibres throughout the disc is horizontal, although in the pars posterior menisci they are unorientated. In the superior stratum of the lateral and medial third's of the disc, the elastic fibres run medially and laterally, probably becoming incorporated with the collagenous fibres of the medial and lateral aspects of the capsule.

The bilaminar zone is not clearly demarcated and the pars posterior menisci is relatively large. The notable feature is the blood vessels of the bilaminar zone - thick walled muscular veins and specialised blood vessels.

The tendinous insertion of the sphenomeniscus muscle and the lateral pterygoid muscle into the hila of the pes menisci and the perichondrium of the head of the condyle can be clearly recognised.

CHAPTER 4.THE STRUCTURE OF THE TEMPOROMANDIBULAR MENISCUS AT 28 YEARS.
OF AGE.SPECIMEN No. 3.

This specimen consists of a temporomandibular meniscus, perichondrium of the condyle and the lateral pterygoid muscle. The spheno-meniscus muscle was not procured. Specimen was removed from a male cadaver aged 28 years - cause of death was coronary occlusion.

Description of this meniscus will follow the pattern of the preceding chapter.

Lateral third of the meniscus. (cf. fig. 154.)Perichondrium of the head of the condyle.

The perichondrium is not well preserved and portion of the condyle has been removed with it. It consists of two bands of collagenous fibres. Associated with these bands of collagenous fibres is a meshwork of fine elastic fibres. As was mentioned before the cartilage of the head of the condyle has been removed with the perichondrium. The superficial part of this cartilage is penetrated by elastic fibres and the most superficial cells consist of small round chondrocytes. The cell layer immediately beneath this consists of flattened and larger round chondrocytes. (figs. 156, 157.)

Special Note. The tissue covering the head of the condyle should be known as the perichondrium. The assumption has been that the cartilage disappears with age, but in fact it persists if not entirely, at least as fibrocartilage. Therefore, strictly, it is perichondrium of the head of the condyle instead of fibrous covering of the head of the condyle.

The deepest layer consists of large hypertrophic chondrocytes with, in certain cases, a pyknotic nucleus and condensation of the capsule. The intercellular substance appears to be calcified. (figs. 154, 155, 156, 157.)

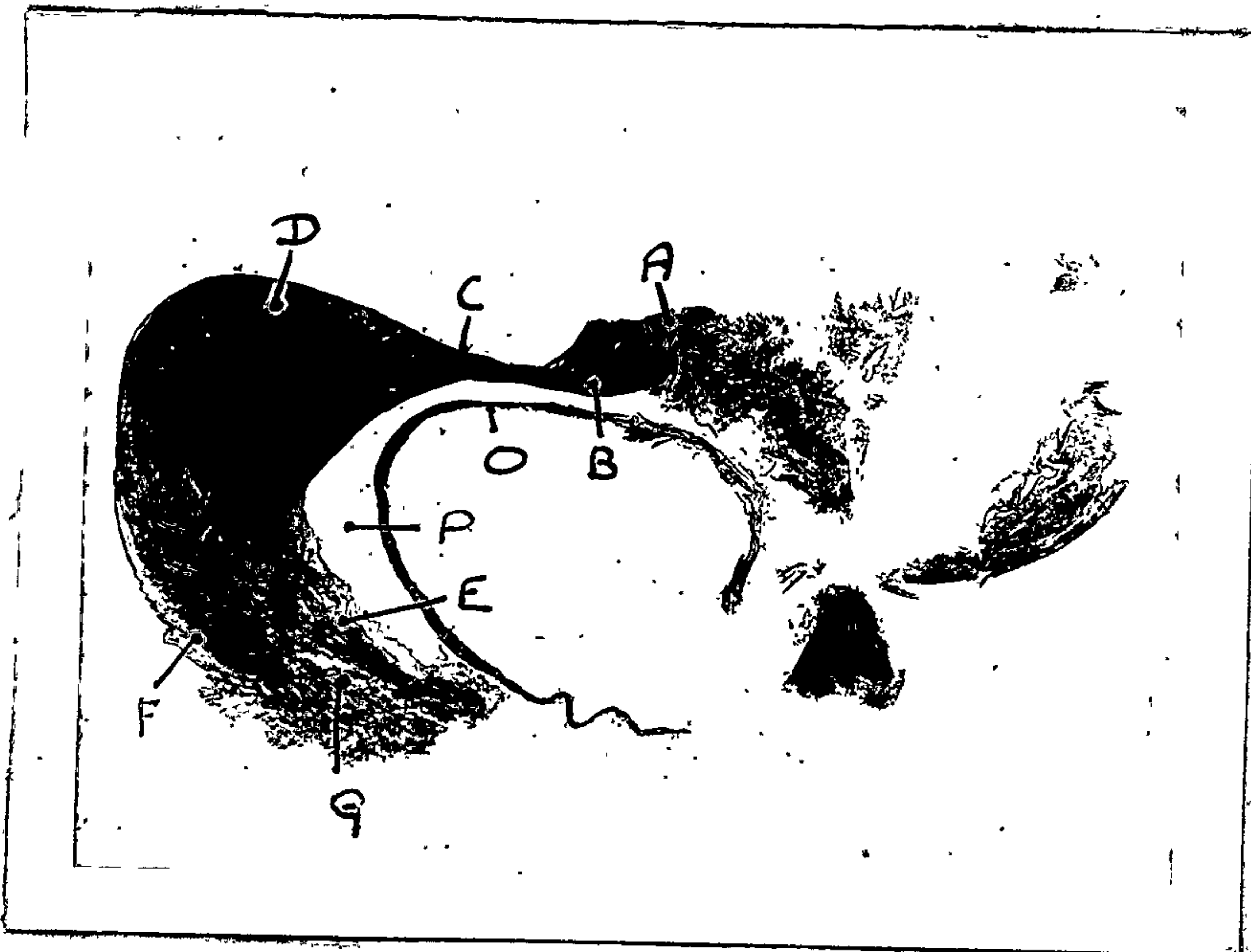


Fig. 154.

Specimen no. 3 - 28 years.

Sagittal section X 5 lateral third temporomandibular meniscus.

- A. Pes menisci.
- B. Head of pes menisci.
- C. Pars gracilis menisci.
- D. Pars posterior menisci.
- E. Inferior stratum.
- F. Superior stratum.
- G. Bilaminar zone.
- O. Perichondrium.
- P. Inferior joint cavity.



Fig. 155.

Perichondrium of condylar head. Showing fibro-elastic layer.
(X 900 of. fig. 154.)



Fig. 156.

Superficial layer of cartilage of head of condyle.
(X 900 cf. fig. 154.)

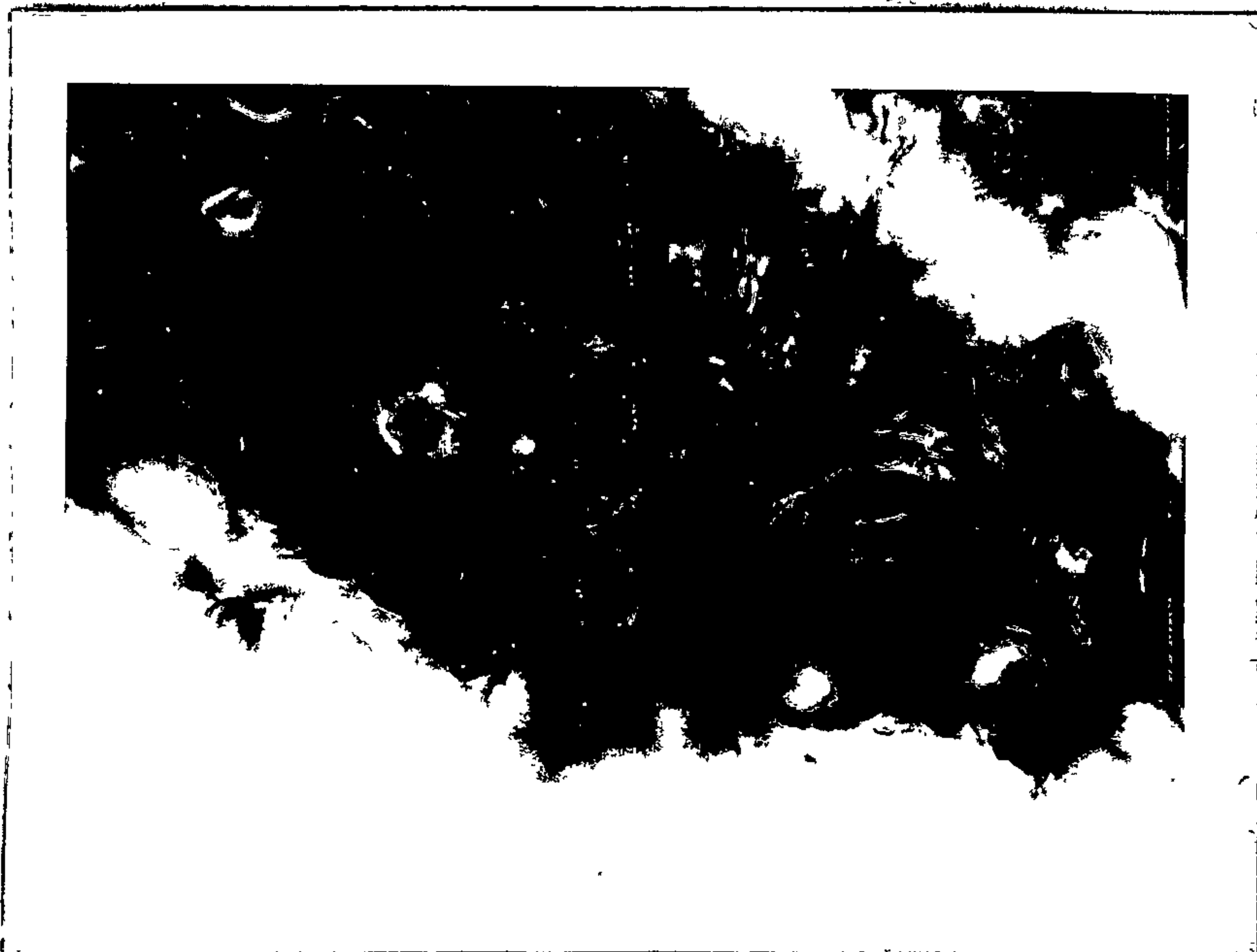


Fig. 157.

Deeper layer of cartilage of head of condyle showing hyper-
trophic cartilage cells and calcified cartilage. (X 900 cf.
fig. 154.)

Pes Menisci. (cf. fig. 154.)

The pes menisci does not exhibit the insertion of the
sphero-meniscus muscle and its most anterior portion consists
of unorientated collagenous fibres associated with a large
number of randomly orientated elastic fibres. (fig. 158/)

Half of the pes menisci consists of unorientated
collagenous fibres and fine elastic fibres. Chondrocytes and

fibroblasts can be demonstrated in the substance. (fig. 159.)

The synovial membrane beneath the anterior portion consists of a well defined single layer of fibroblasts above which there is a fairly extensive band of connective tissue containing blood vessels and elastic fibres. (fig. 160.)

The synovial membrane beneath the hela of the pes menisci consists mainly of widely spaced chondrocytes and fibroblasts. There is no sub synovial connective tissue. (fig. 161.)

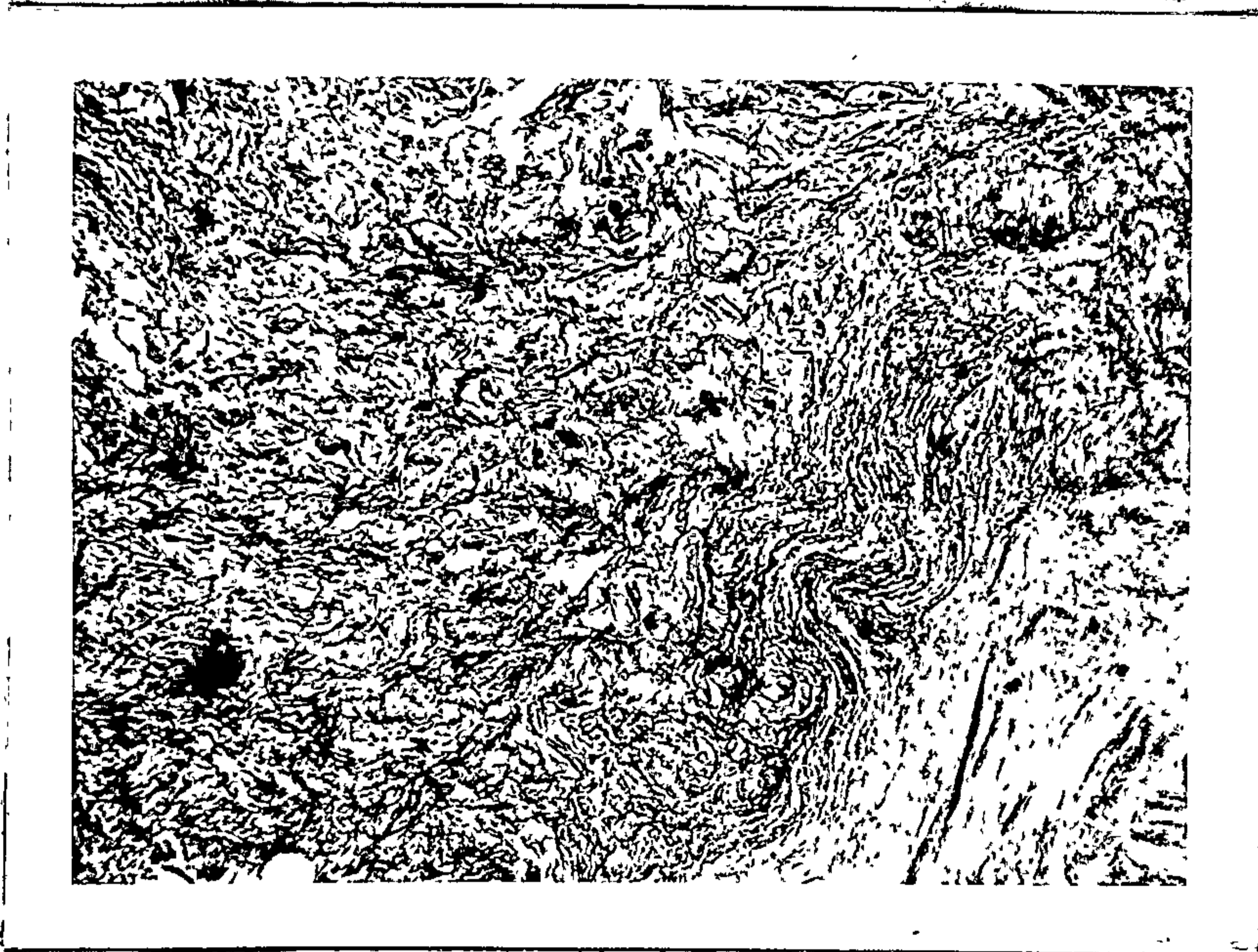


Fig. 158.

Pes menisci showing quite abundant elastic fibre component.
(X 270 cf. fig. 154.)

.....

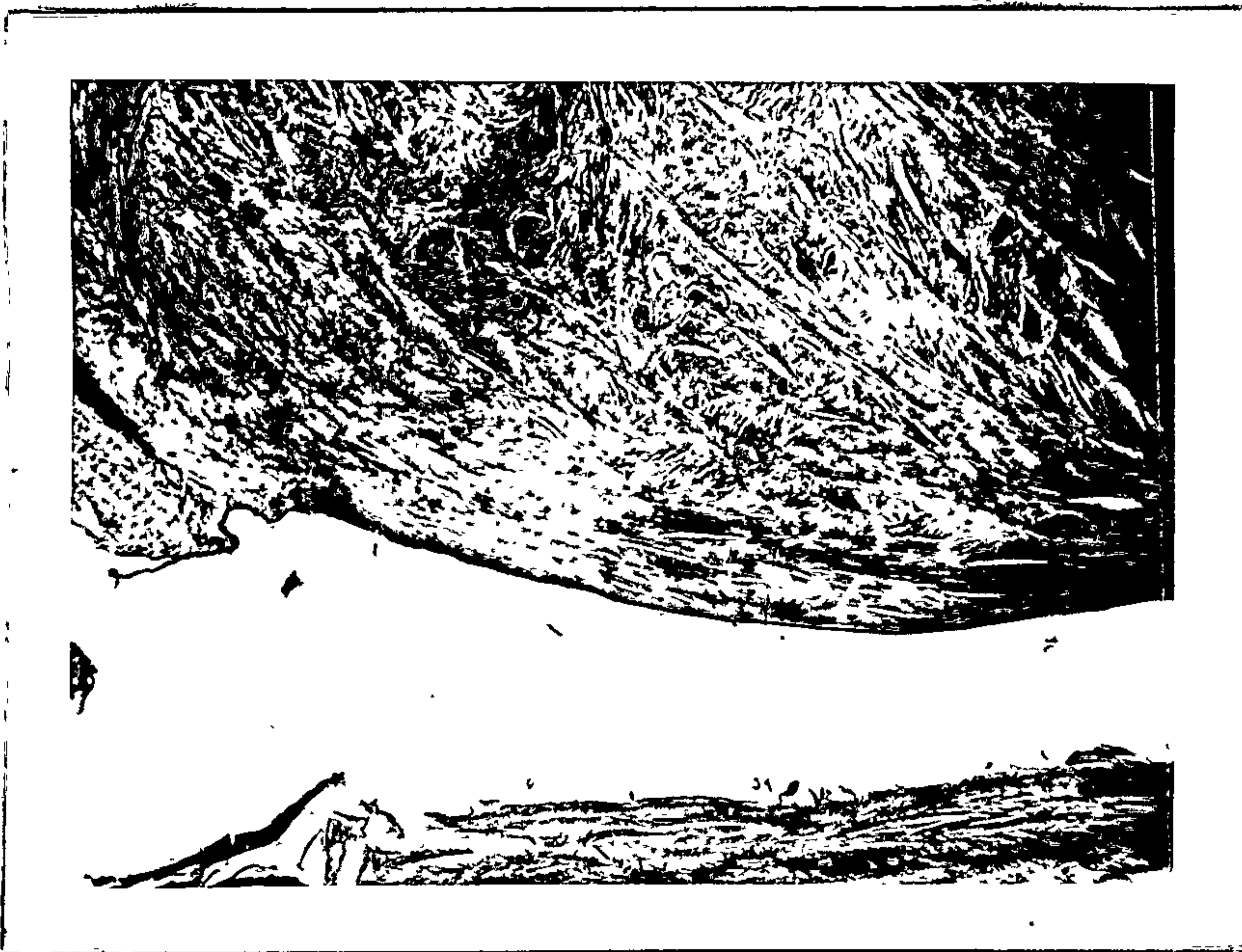


Fig. 159.

Hela of pes menisci. (X 80 cf. fig. 154.)

The collagenous fibres appear to be relatively unorientated.

.....

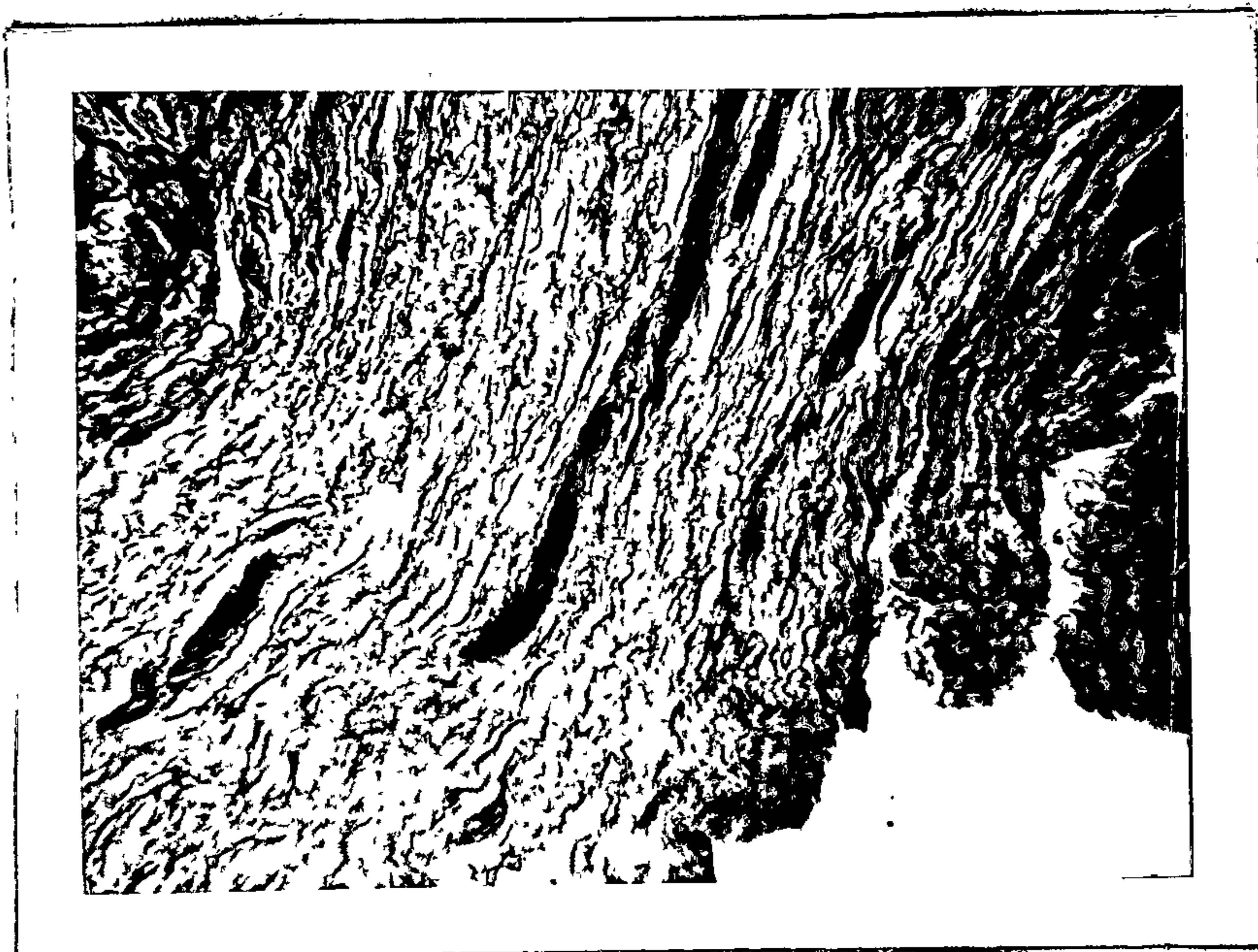


Fig. 160.

Synovial membrane inferior to pes menisci. (X 270 of. fig. 154.) Note: Extensive zone of loose vascular sub synovial connective tissue.

.....



Fig. 161.

Synovial membrane inferior to the posterior part of head of pes menisci is reduced to a fibroblastic or chondrocytic layer above which is dense fibrous tissue or fibro cartilage. (X 270 of. fig. 154.)

.....

Part Gracilis Menisci. (cf. fig. 154.)

Consists of well orientated collagenous and elastic fibres. In this section the majority of cells appear to be fibroblasts and the synovial membrane on either surface of this part of the meniscus consists of widely spaced fibroblasts. There is no sub synovial connective tissue. (fig. 162.)

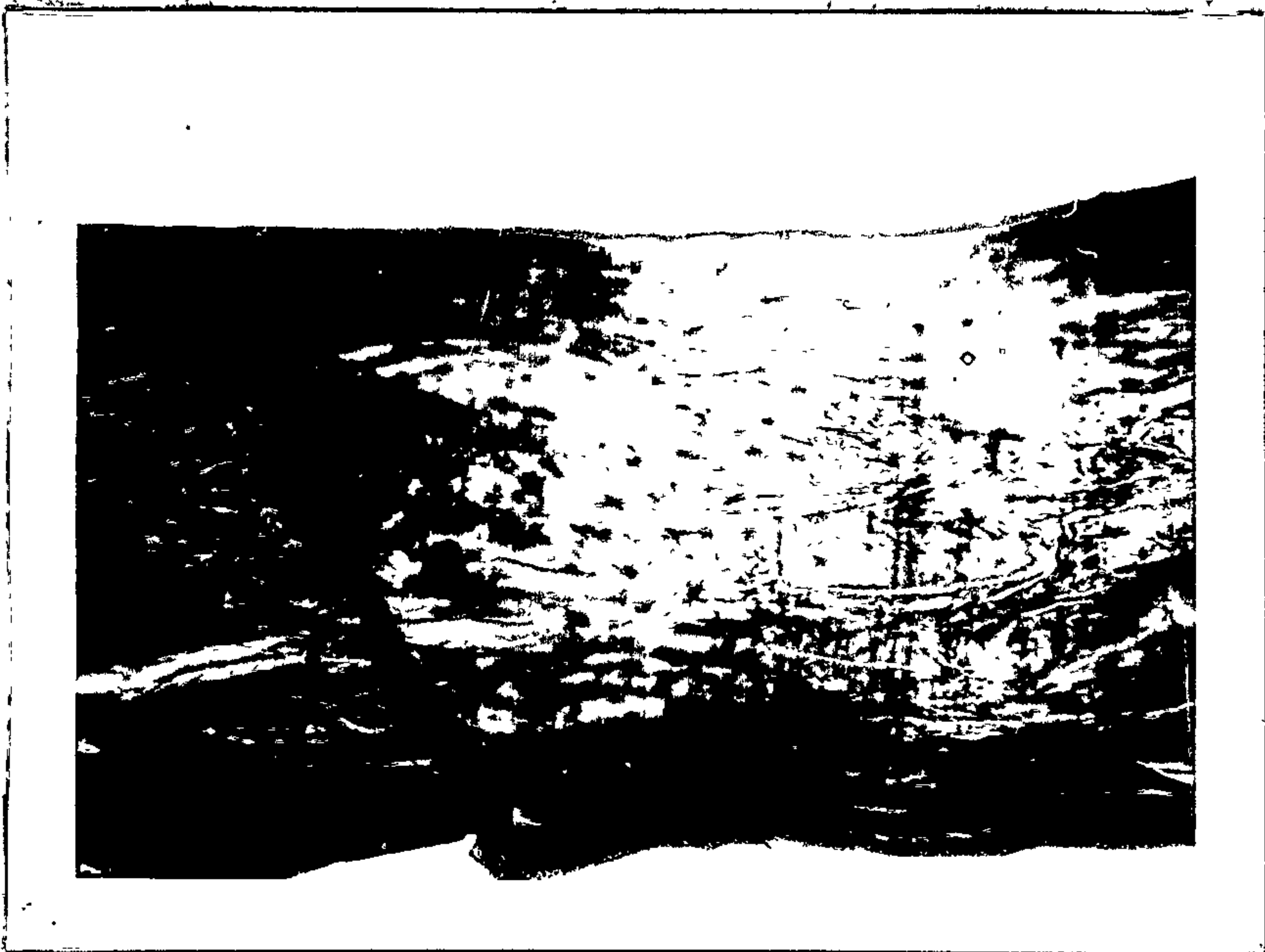


Fig. 162.

Pars gracilis menisci. (X 80 cf. fig. 154.)

.....
Pars Posterior Menisci. (cf. fig. 154.)

Consists of unorientated collagenous fibres and fine elastic fibres. The main cell type is large oval chondrocytes. The synovial membrane is structurally the same as in the pars gracilis menisci. (figs. 163, 164.)



Fig. 163.

Pars posterior menisci demonstrating unorientated collagenous fibres. (X 80 cf. fig. 154.)

.....

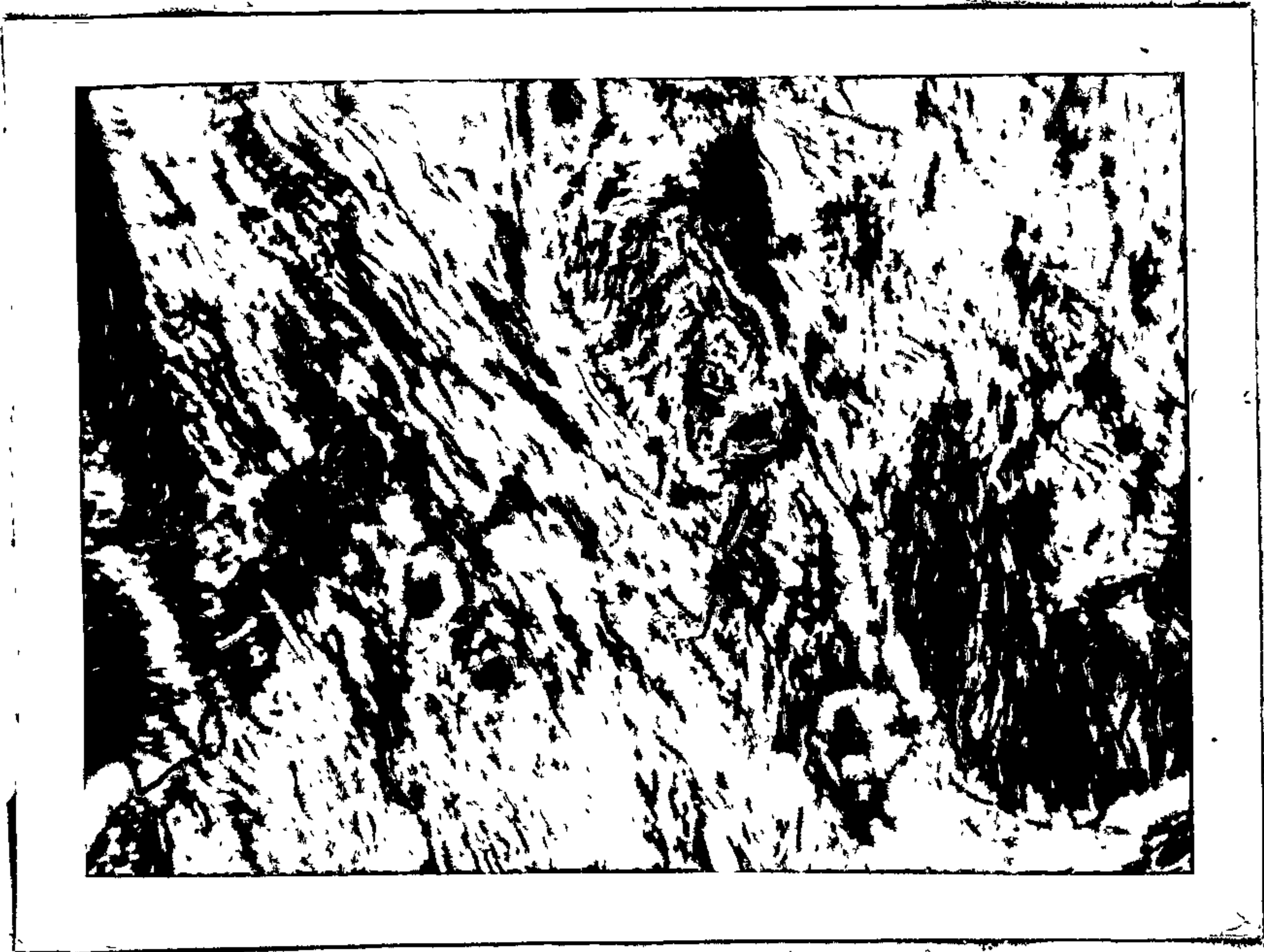


Fig. 164.

Cellular component of para posterior meniscus. (X 900 cf. fig. 154.) Appears to be mainly chondrocytic with sparse relatively fine elastic fibres.

.....

Superior Stratum. (cf. fig. 154.)

The most posterior part of this structure has been lost. Part of the superior stratum is preserved and it consists of collagenous fibres orientated longitudinally and elastic fibres orientated in the main with the collagenous fibres, but branching and anastomosing freely. (figs. 165, 166.) The synovial membrane is well defined and consists of a layer of fibroblasts 1 to 2 cells thick, exhibiting numerous invaginations. The sub synovial connective tissue is loose and contains numerous blood vessels. (figs. 167, 168.)

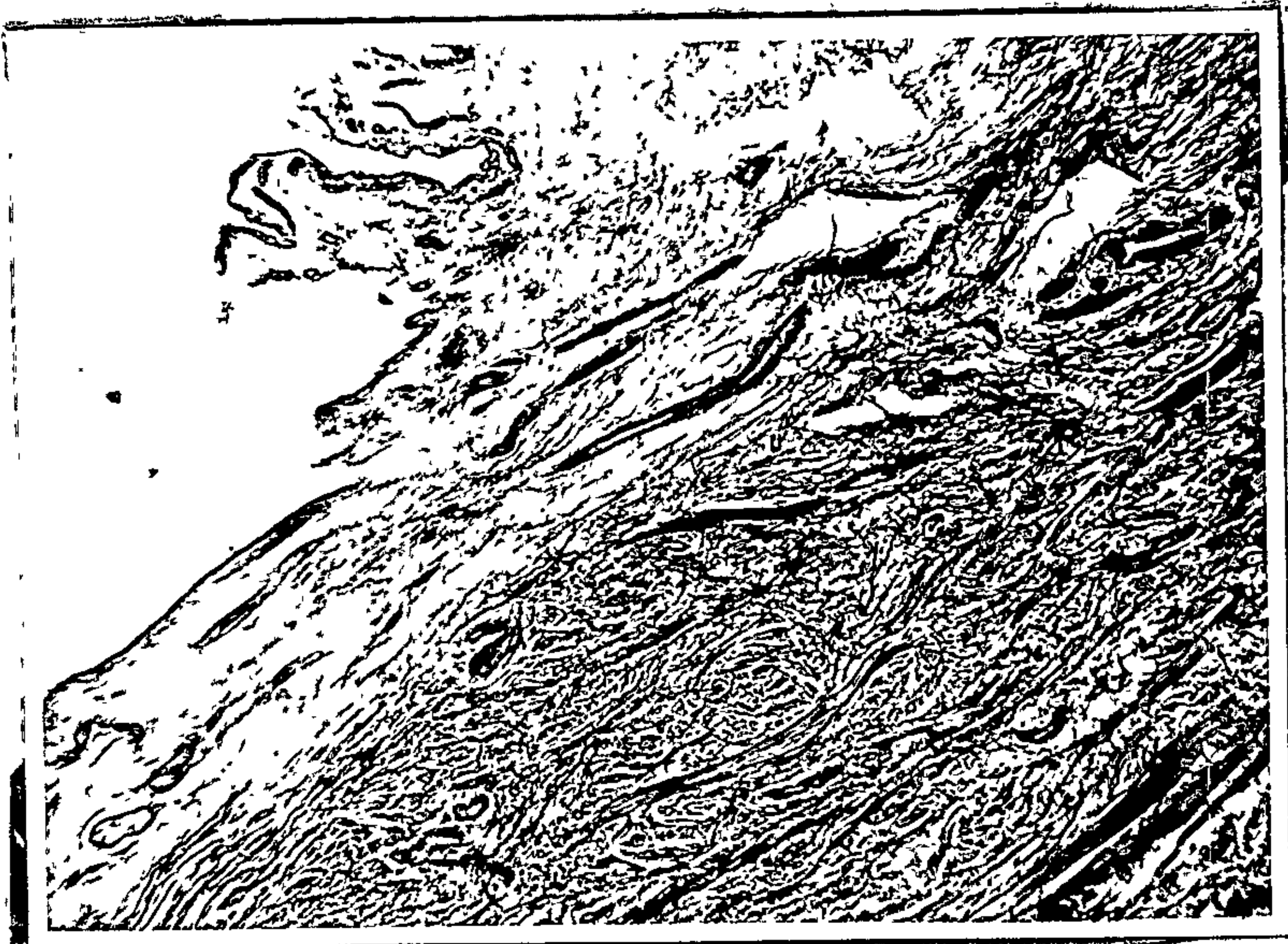


Fig. 165.

Superior stratum showing an extensive sub-synovial connective tissue zone. (X 80 cf. fig. 154.)

.....



Fig. 166.

Superior stratum showing elastic fibre component. (X 270 cf. fig. 154.)

.....



Fig. 167.

Synovial membrane above superior stratum. (X 270 of. fig. 154.) Note: Sub synovial vascular connective tissue.

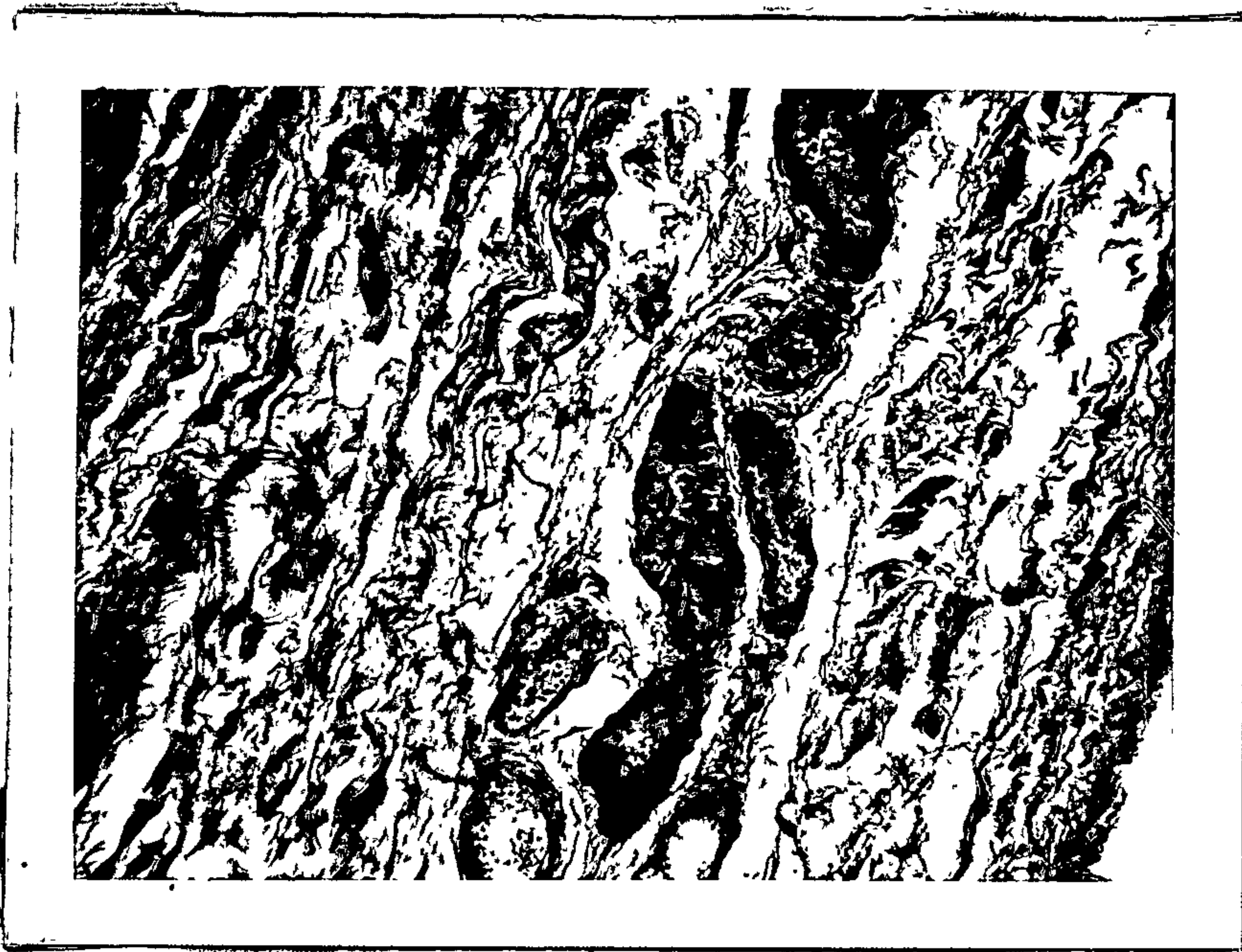


Fig. 168.

Blood vessels in the sub synovial connective tissue of the synovial membrane above the superior stratum. (X 270 of. fig. 154.)

Inferior Stratum. (of. fig. 154.)

This structure is complete and consists of collagenous fibres orientated parallel to each other and pursuing a wavy course. Fine elastic fibres can be demonstrated amongst the collagenous fibres. (fig. 169). The synovial membrane inferior to the inferior stratum is well defined and consists of a layer 1 to 2 cells thick of fibroblasts. (fig. 170.)

The sub synovial connective tissue is very extensive and consists of loose connective tissue and elastic fibres. It contains numerous blood vessels. (figs. 169, 170.)

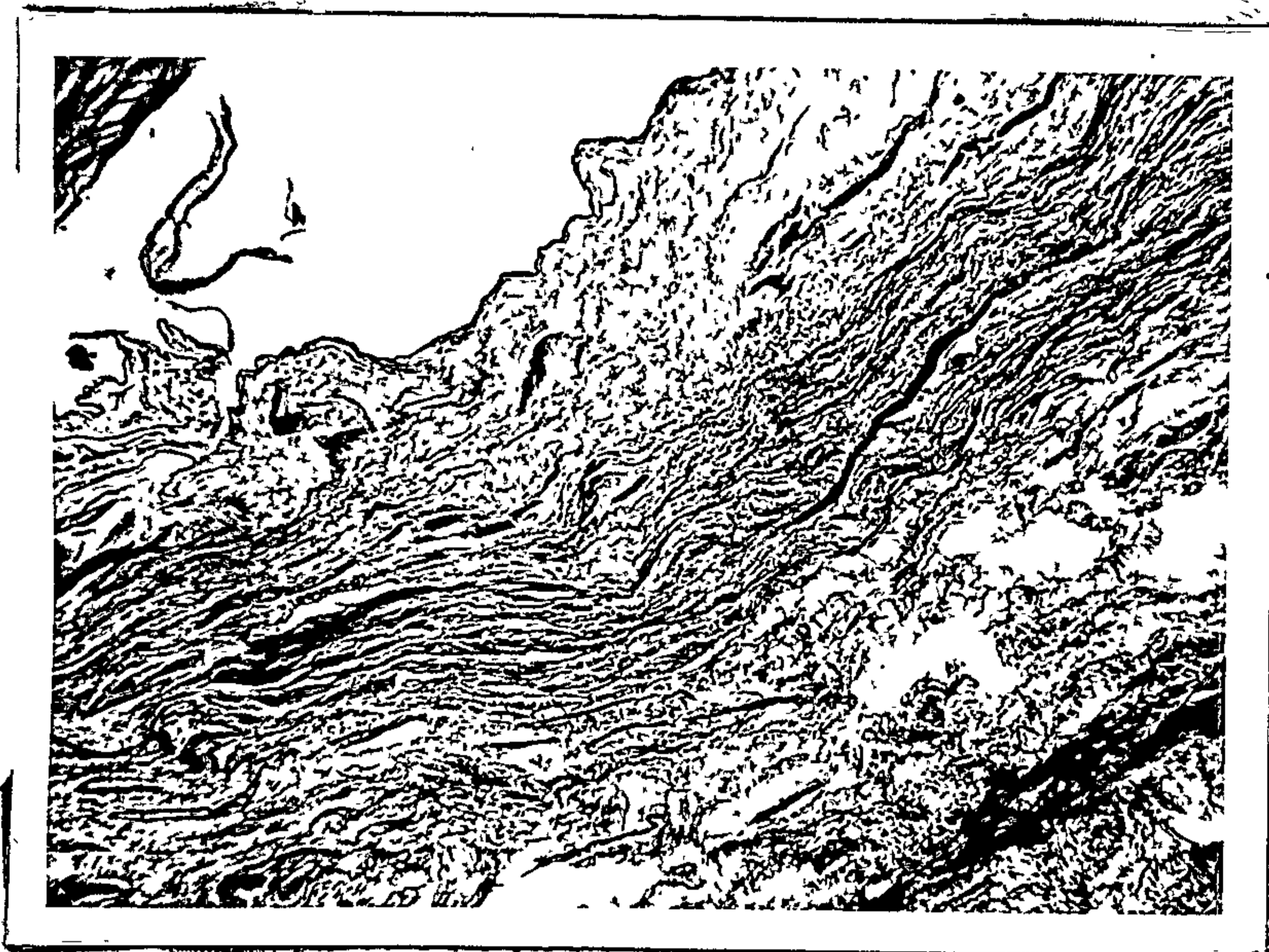


Fig. 169.

Inferior stratum showing an extensive sub synovial connective tissue zone, inferior to it. (X 30 cf. fig. 154.)

.....



Fig. 170.

Synovial membrane below inferior stratum appears to be reduced to a flat fibroblastic layer embedded in collagenous tissue above which there is a zone of loose connective tissue. (X 900 cf. fig. 154.)

.....

Bilaminar Zone. (cf. fig. 154.)

Consists of loose neuro-vascular connective tissue in which elastic fibres are quite dense, rather thick, and

exhibit an interlacing pattern. The vascularity of this part of the meniscus including the inferior stratum and superior stratum is well marked. (figs. 171, 172.)



Fig. 171.

General field of the bilaminar zone. (X 270 of. fig. 154.)



Fig. 172.

Small arteries of the bilaminar zone. (X 900 of. fig. 154.)

Pterygo-Condylar Area.

This area cannot be demonstrated owing to absence of the spheno-meniscus muscle.

Middle third of the meniscus. (of. fig. 173.)

This section exhibits the insertion of the spheno-meniscus muscle into the pes menisci and some fibres of the lateral pterygoid muscle. Although the insertion of this

muscle into the pericapsula of the condyle at the pterygoid fovea cannot be seen, the fibre pattern of the spheno-menisceus muscle is cut transversely so that it would be inserting into the pes menisci somewhat obliquely and the inserting tendons can be seen. The tendons become continuous or end freely among the collagenous fibres of the pes menisci.

(fig. 173.)

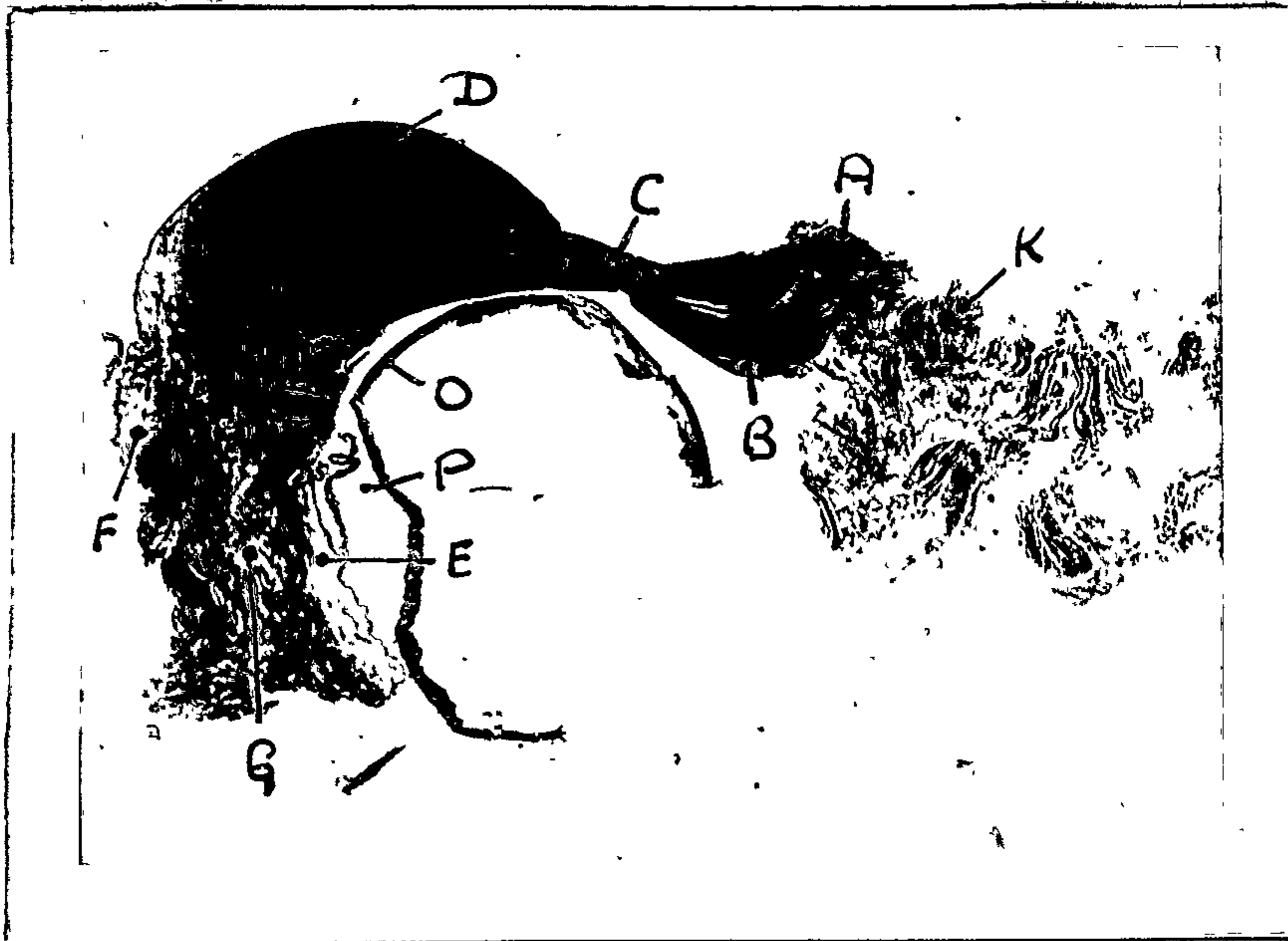


Fig. 173.

Specimen no. 3 - 28 years.

Sagittal section X 5 middle third temporomandibular meniscus.

- A. Pes menisci.
- B. Hela of pes menisci.
- C. Pars gracilis menisci.
- D. Pars posterior menisci.
- E. Inferior stratum.
- F. Superior stratum.
- G. Bilaminar zone.
- K. Lateral pterygoid muscle.
- O. Perichondrium.
- P. Inferior joint cavity.

Pes Menisci. (cf. fig. 173.)

The collagenous fibres of the pes menisci are in the main parallel to each other although some are cut transversely. Intermingling with the collagenous fibres are fine elastic fibres. The hela of the pes menisci consists of unorientated collagenous and elastic fibres and the main cell type is chondrocytic in nature.

The synovial membrane inferior to the pes menisci consists of a definite layer of fibroblasts beneath which there is quite an extensive layer of sub synovial connective

tissue among which there are numerous blood vessels. Projections of this synovial membrane into the inferior joint cavity can be seen. Superior to the pes anisii is a similar definite layer of synovial membrane, synovial villi and a less extensive zone of sub synovial connective tissue.

The synovial membrane inferior to the head of the pes anisii consists of a layer of widely spaced chondrocytes and fibroblasts. There is no sub synovial connective tissue.

Pars Gracilis Menisci. (cf. fig. 173.)

Consists of well orientated collagenous fibres and fine elastic fibres similarly orientated. The cells are chondrocytic in nature.

The synovial membrane on the inferior and superior surface of the meniscus consists of widely spaced chondrocytes and there is no sub synovial connective tissue.

Pars Posterior Menisci. (cf. fig. 173.)

Consists of unorientated collagenous fibres among which are a few fine elastic fibres. The cells are chondrocytic in nature and the synovial membrane is similar to that described in the pars gracilis menisci.

Superior Stratum. (cf. fig. 173.)

This stratum is not well preserved in its most posterior aspect. It consists of collagenous fibres and elastic fibres well orientated and running in the sagittal plane.

There is a definite layer of synovial membrane superior to the stratum consisting mainly of one cell thickness. The sub synovial connective tissue is quite extensive and very vascular.

Inferior Stratum. (cf. fig. 173.)

Consists of collagenous and elastic fibres running parallel to each other and exhibiting a wavy appearance. (fig. 174.) Beneath it there is a well definable synovial membrane exhibiting quite extensive projections into the

inferior joint cavity. (fig. 175.) Synovial villi are also prominent at the anterior extremity of the inferior stratum. There is an extensive vascular zone of sub synovial connective tissue. (figs. 174, 175.)

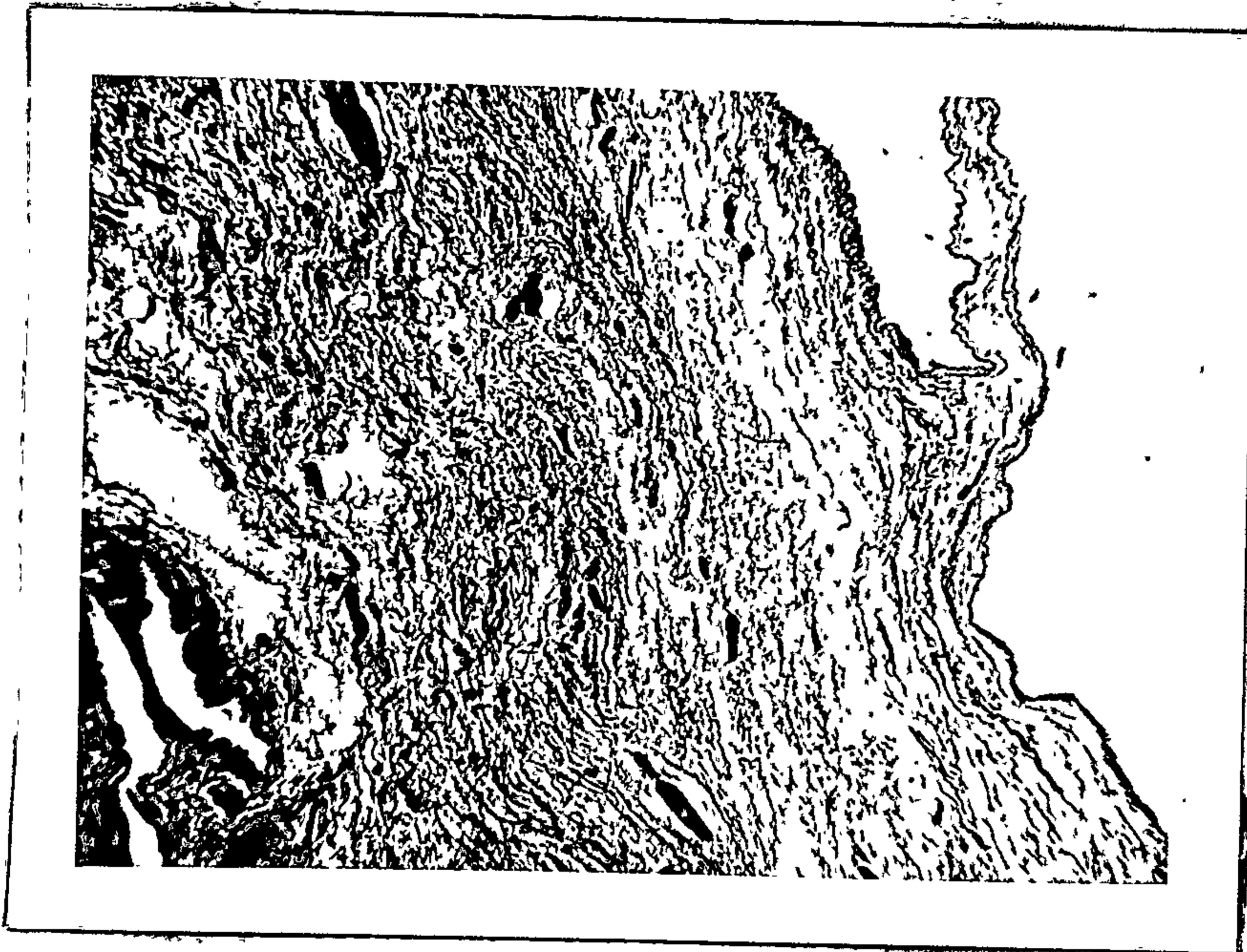


Fig. 174.

Inferior stratum (X 80 cf. fig. 173.)

Note: Extensive zone of sub synovial connective tissue.

.....

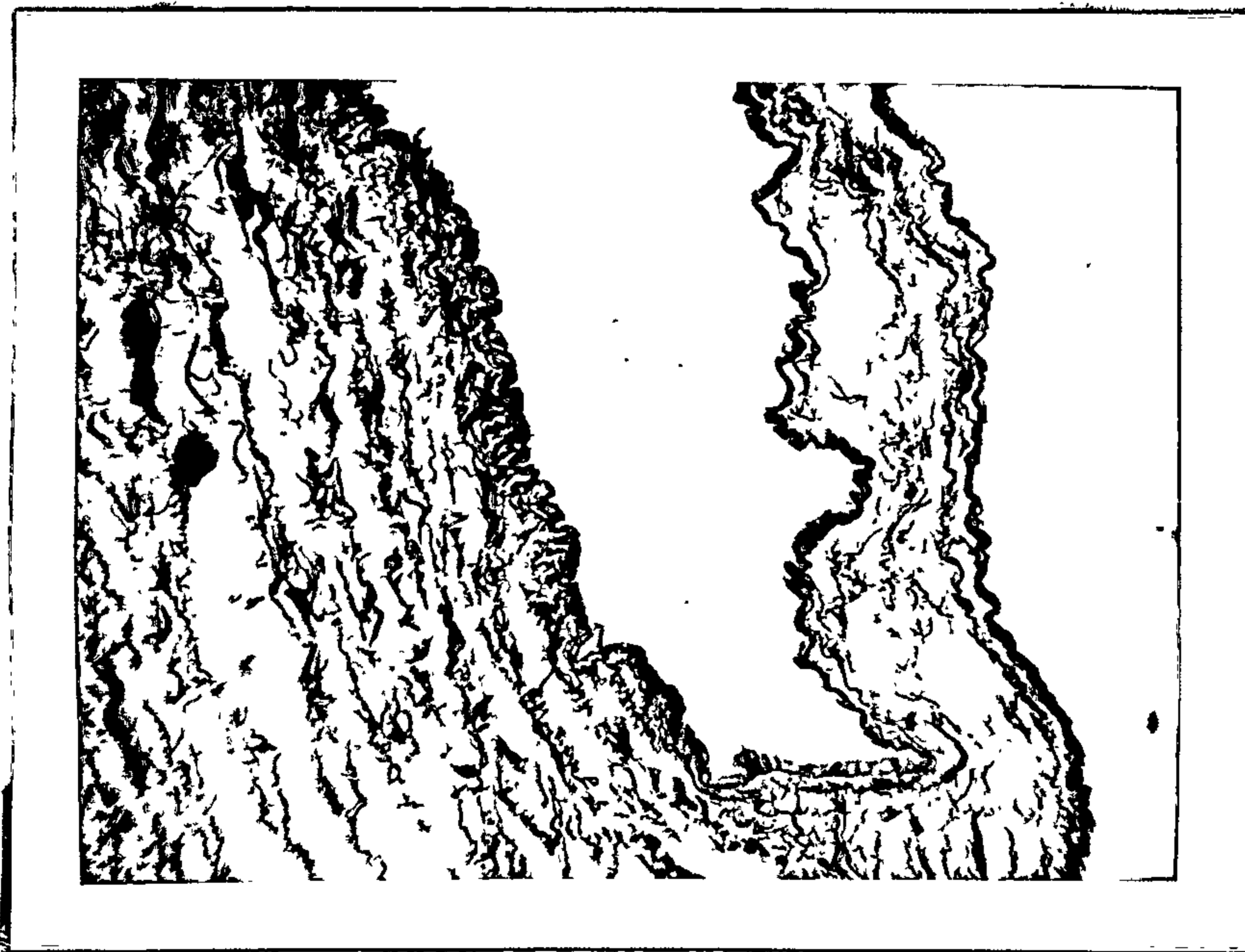


Fig. 175.

Synovial membrane beneath the inferior stratum. (X 270 cf. fig. 173.) The synovial membrane has a chondrocytic appearance.

.....

Eliminar Zone. (cf. fig. 173.)

Consists of fairly loose neuro-vascular connective tissue and fine elastic fibres forming a three dimensional

network. The inferior extremity of the genu vasculosis menisci can be seen in this section. (fig. 7.)

Perichondrium of the head of the Condyle. (cf. fig. 173.)

The perichondrium of the head of the condyle is much better preserved in this section than the preceding one and exhibits a superficial layer of chondrocytes and fibroblasts. Beneath which there is a fibro-elastic layer orientated in respect to the curvature of the head of the condyle. Beneath this rather dense layer there is a layer of less density and the fibres appear to interlace with each other. This layer is inserted into the cartilage of the head of the condyle and the cartilage exhibits the same cell types as were described in the previous section. (figs. 176, 177, 178, 179.) Collagenous fibres are incorporated in the cartilage matrix.



Fig. 176.

Perichondrium, condylar head. (X 270 cf. fig. 173.)



Fig. 177.

Fibro elastic layer, condylar head (X 900 cf. fig. 173.)

Note: it is fairly well orientated.

.....



Fig. 178.

Unorientated layer of interlacing collagenous and elastic fibres. (X 900 cf. fig. 173.)

.....



Fig. 179.

Cartilage of condyle beneath perichondrium. (X 900 cf. fig. 173.) Note: Cytomorphosis of cartilage cells.

.....

Pterygo-Condylar Area.

This area is still not evident in this section owing to the lack of the insertion of the fibres of the lateral pterygoid muscle into the pterygoid fovea of the condyle.

Medial third of the Meniscus. (cf. fig. 180.)

Perichondrium of the Head of the Condyle.

This structure is the same as the preceding section (fig. 180.)

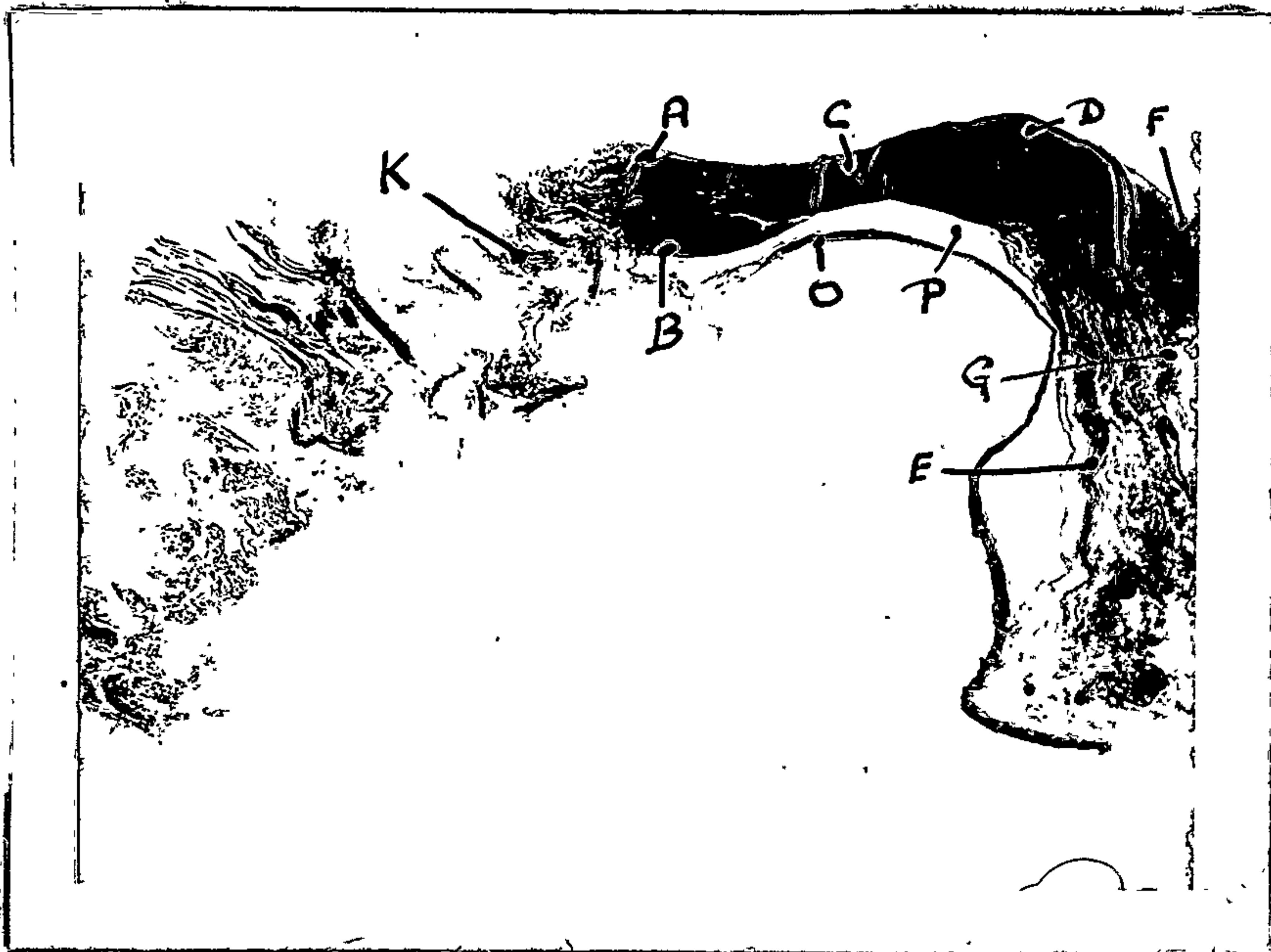


Fig. 180.

Specimen no. 3 - 28 years.

Sagittal section X 5 medial third temporomandibular meniscus.

- A. Pes menisci.
- B. Helix of pes menisci.
- C. Pars gracilis menisci.
- D. Pars posterior menisci.
- E. Inferior stratum.
- F. Superior stratum.
- G. Bilaminar zone.
- K. Lateral pterygoid muscle.
- O. Perichondrium.
- P. Inferior joint cavity.

Pes Menisci. (cf. fig. 180.)

The fibres of the spheno-meniscus muscle are not so transverse as in the preceding section and its tendinous insertion can be clearly seen. The collagenous fibres of the pes menisci are fairly well orientated and associated with them are elastic fibres forming a three dimensional pattern. The synovial membrane inferior to the pes menisci exhibits a definite layer of fibroblasts and the sub synovial connective tissue is not very extensive. A similar layer of synovial membrane can be seen superior to the pes menisci beneath which there is a fairly extensive layer of sub synovial connective tissue.

The helix of the pes menisci consists of unorientated collagenous and elastic fibres. The synovial membrane inferior to the helix consists of a flattened layer of fibroblasts and there is no sub synovial connective tissue.

Pars Gracilis Menisci. (cf. fig. 180.)

This structure is similar to that of the preceding section and also the synovial membrane associated with it.

Pars Posterior Menisci. (cf. fig. 180.)

This structure exhibits a similar pattern to that of the preceding section.

Superior Stratum. (cf. fig. 180.)

This stratum is again not well preserved in its most posterior aspect. It is similar to specimens previously described.

Inferior Stratum. (cf. fig. 180.)

This stratum is more demarcated in this section than in previous sections and its full extent can be ascertained. It is seen to terminate in the loose connective tissue posterior to the periosteum of the condyle.

Bilaminar Zone. (cf. fig. 180.)

This zone is seen to be of a similar structure as in the two sections previously described.

Pterygo-Condylar Area.

This area is still not in evidence owing to failure to procure the insertion of the lateral pterygoid muscle at the pterygoid fovea of the condyle.

SUMMARY.

This specimen confirms the morphological features described in previous specimens and particularly the fact that cartilage still covers the articular slopes of the condyle at 28 years of age.

The vascular parts of the meniscus are particularly notable and it is probable that a proliferation of blood vessels has occurred. Associated with this proliferation of blood vessels are myelinated and unmyelinated nerve fibres. The smaller arteries in particular exhibit atheroma and it may be that this was associated with systemic vascular disease. On the other hand, it could be that the proliferation of blood vessels contributed to the existing cardio-vascular disease with fatal results.

A notable feature is the modification of the synovial membrane superior and inferior to the pars gracilis menisci and the pars posterior menisci. This probably is associated with the fact that the articular surfaces of the meniscus are restricted to these parts.

Genu Vasculosis Menisci.

A similar vascular canal can be seen in the same area. (cf. fig. 7.) There has been a proliferation of vascular tissue which may be a glomus tumor.

CHAPTER 5.THE STRUCTURE OF THE TEMPOROMANDIBULAR MENISCUS AT 58 YEARS
OF AGE.Specimen no. 4.

Specimen consists of perichondrium of the head of the condyle, insertion of the lateral pterygoid muscle into the periosteum of the condyle, insertion of the spheno-meniscus muscle into the pes menisci, the inferior stratum and very little of the superior stratum was procured except in its anterior aspect.

Lateral third of the Meniscus. (cf. fig. 181.)Perichondrium of the head of the condyle.

Consists of a superficial layer of cells of a chondrocytic or fibroblastic nature, beneath which is a dense layer of fibrous tissue. The fibres are orientated mainly in respect to the curvature of the head of the condyle, beneath which is a layer of interlacing collagenous fibres. The elastic component is not marked. Collagenous and elastic fibres incorporated in the cartilage covering the articular surfaces of the condyle are seen in the deepest layer of the perichondrium. The cartilage covering the head of the condyle exhibits well defined layers which have been previously described and in this specimen a well defined intermediate layer of flattened chondrocytes can also be seen. Cytomorphosis of the cartilage cells is occurring. The fibre component of the cartilage matrix is quite evident in this section. (figs. 181, 182, 183, 184, 185.)

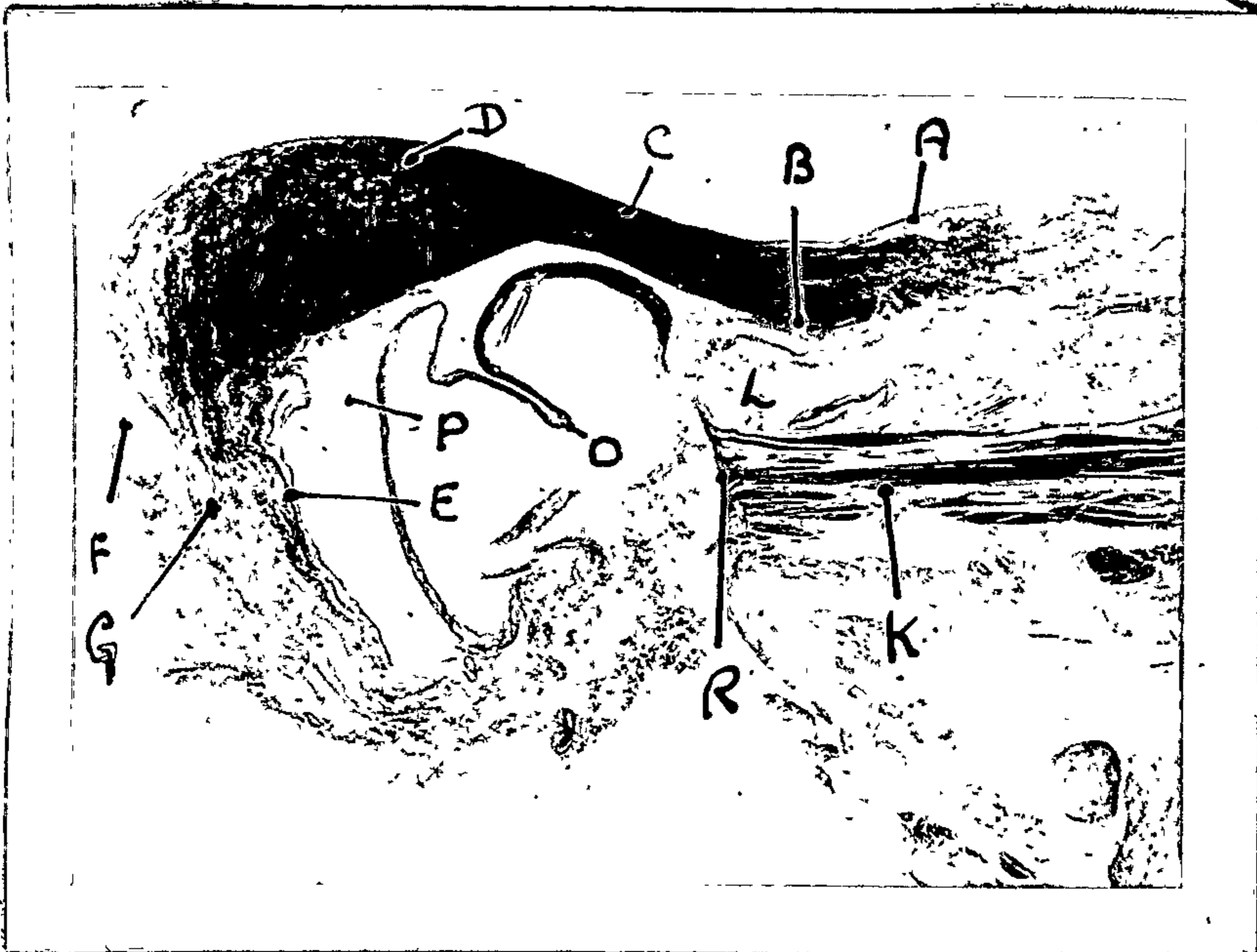


Fig. 181.

Specimen no. 4 - 58 years.

Sagittal section X 5 lateral third temporomandibular meniscus.

- A. Pes Menisci.
- B. Hela of the pes menisci.
- C. Pars gracilis menisci.
- D. Pars posterior menisci.
- E. Inferior stratum.
- F. Superior stratum.
- G. Bilaminar zone.
- K. Lateral pterygoid muscle.
- L. Pterygo-condylar area.
- O. Perichondrium.
- P. Inferior joint cavity.
- R. Periosteum.

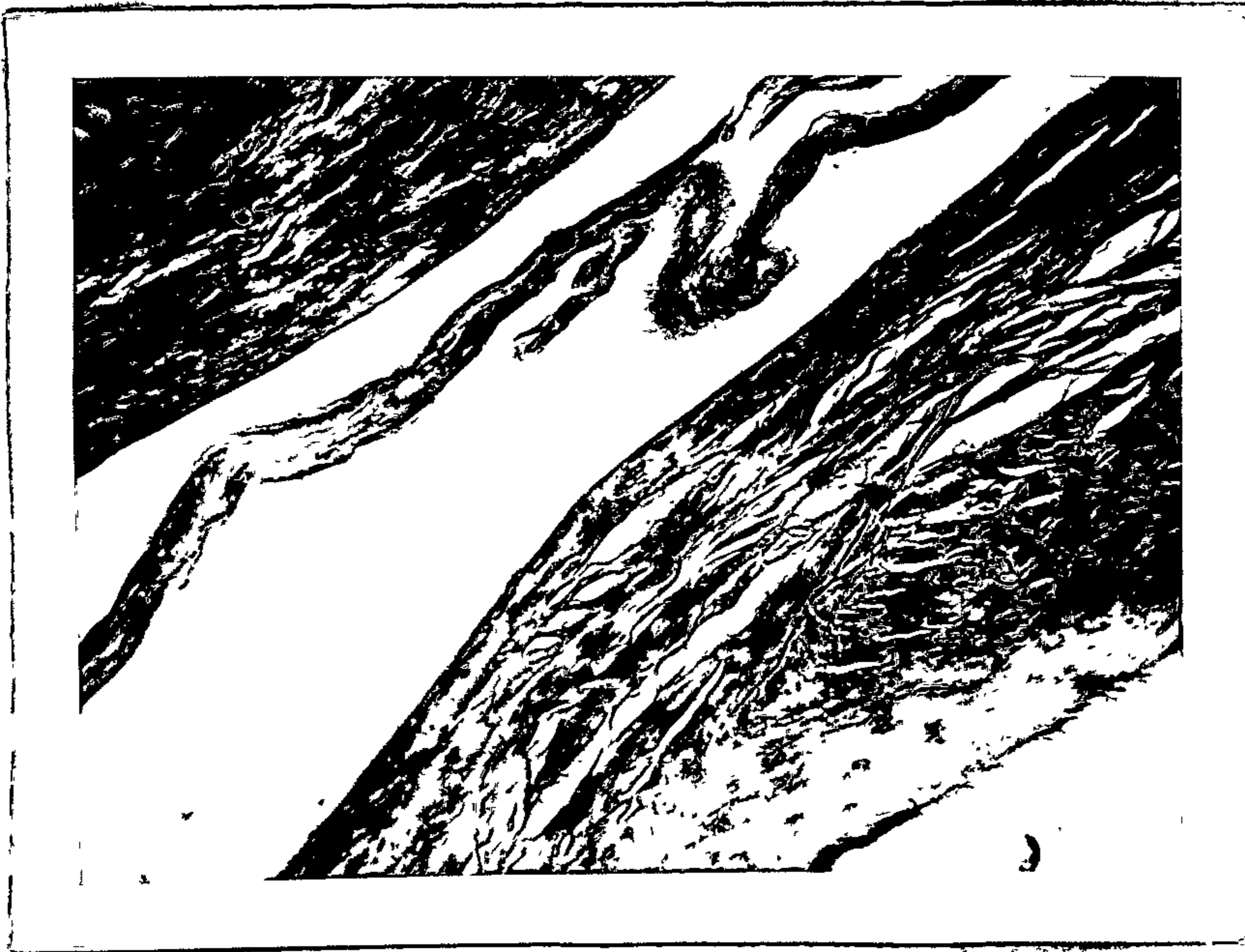


Fig. 182.

General view perichondrium, condylar head (X 270 cf. fig. 181.)



Fig. 183.

Superficial layer of perichondrium. Head of condyle.
(X 900 cf. fig. 181.) Note: Chondrocytic nature of
cells.

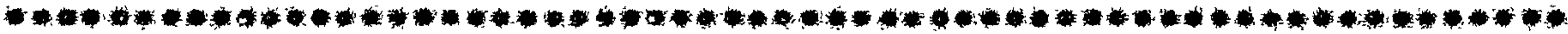


Fig. 184.

Perichondrium. Head of condyle. (X 900 of. fig. 181.)

A. Intermediate layer.





Fig. 185.

Perichondrium. Head of condyle. (X 900 cf. fig. 181.)
 Cytomorphosis of cartilage cells. Note: Elastic fibres.

.....
The Pterygo-Condylar Area. (cf. fig. 181.)

The pterygo-condylar area is quite apparent in this section and, as previously described, is constituted by inserting fibres of the spheno-meniscus and the helix of the pes menisci; inserting fibres of the lateral pterygoid muscle into the pterygoid fovea of the condyle; the base being the periosteum of the inferior part of the anterior articular slope of the condyle. (figs. 186, 187.) It contains numerous blood vessels, myelinated and unmyelinated nerve fibres.

In this particular section, the helix of the pes menisci is excluded from the pterygo-condylar area by the diverging superior fibres of the inferior tendinous insertion of the lateral pterygoid muscle into the pterygoid fovea of the condyle. This appears to be variable, sometimes it is excluded laterally and medially by these divergent superior fibres of the lateral pterygoid muscle.

Particularly noticeable in this section is an epithelioid cell type arterio-venous-anastomoses in the pterygo-condylar area. From the perichondrium of the head of the condyle the synovial membrane extends anteriorly for a distance then is reflected and runs beneath the most

anterior part of the hila of the pes menisci. It is exceptionally well defined and consists of a fairly continuous layer of flattened fibroblasts. In certain places the cells become chondrocytic in nature and it may be 2 to 3 layers thick, beneath this is a layer of very loose connective tissue which is highly vascular. In places the blood vessels become incorporated in the synovial layer and they lie very close to the synovial cavity. Numerous villi project into the anterior and inferior joint cavities. (figs. 188, 189, 190.)

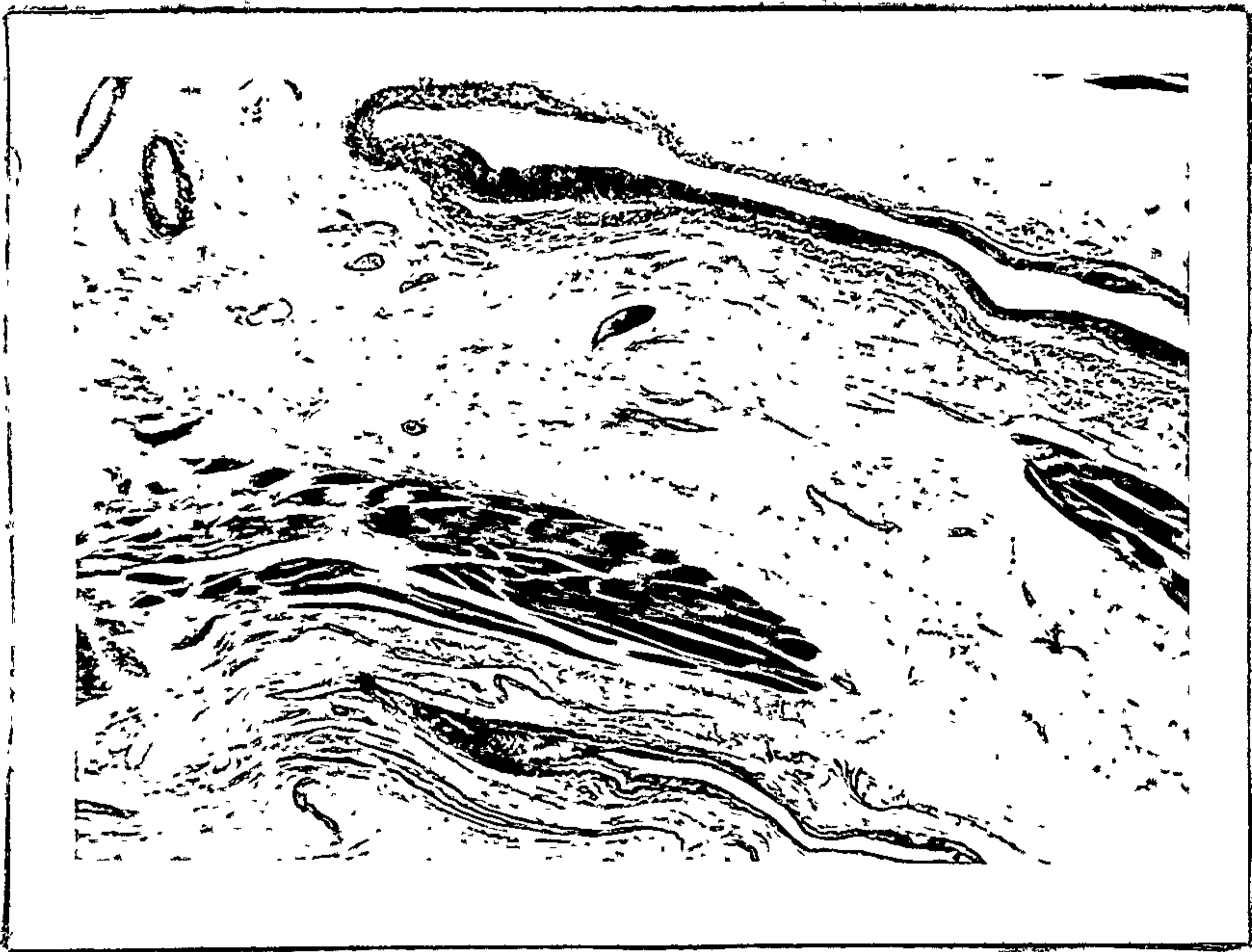


Fig. 186.

Pterygo-condylar area. (X 80 cf. fig. 181.) showing neurovascular connective tissue.

.....



Fig. 187.

Ptergo-condylar area. (X 900 cf. fig. 181, 186.) showing nerve in transverse section.

.....



Fig. 188.

Junction of perichondrium with synovial membrane. (X 80 cf. fig. 181.)

- A. Perichondrium.
- B. Synovial membrane.
- C. Synovial villi.
- D. Reflection of synovial membrane beneath head of pes menisci.
- E. Antero-inferior joint cavity.
- F. Head of pes menisci.

.....

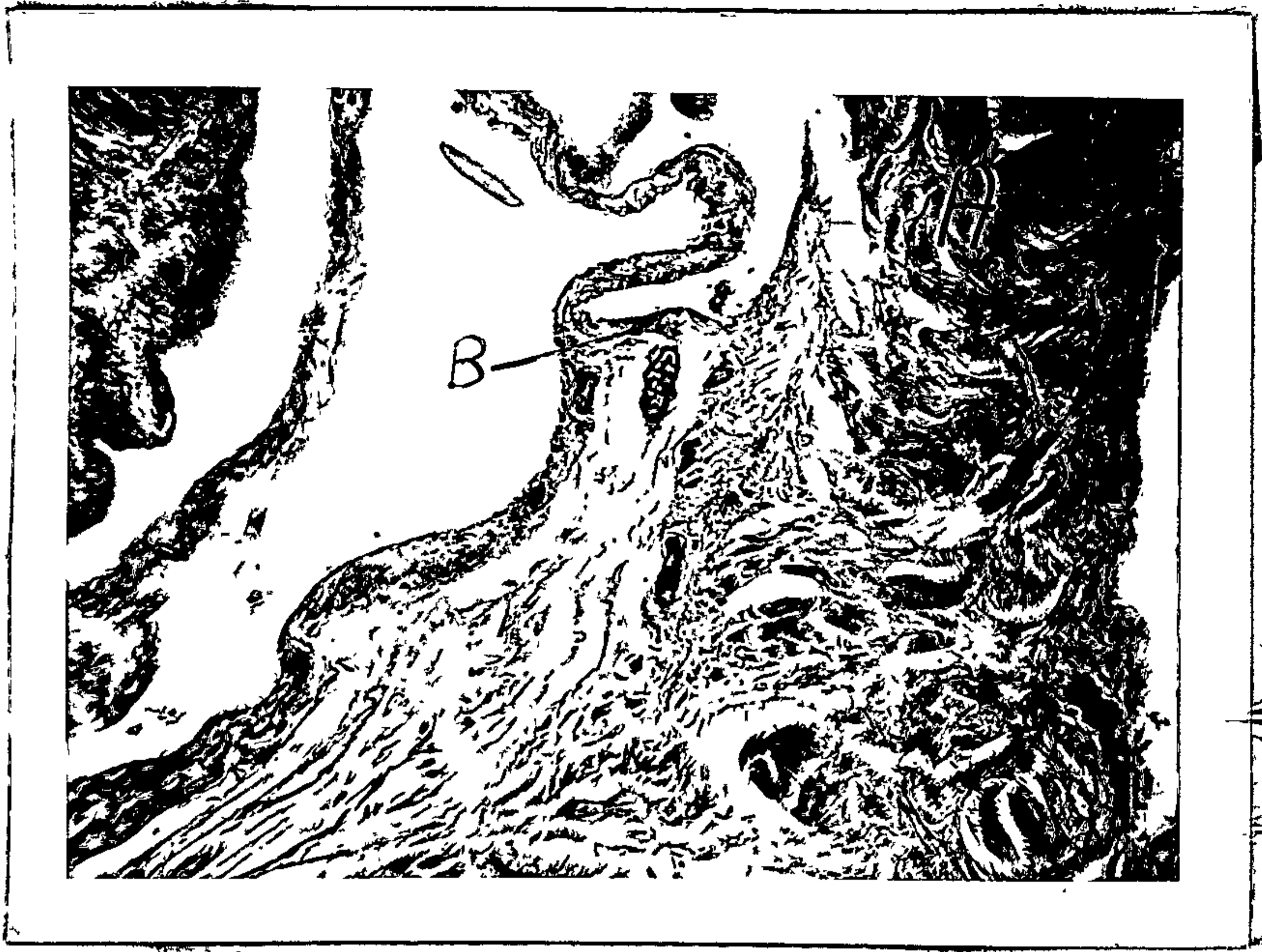


Fig. 189.

Junction of perichondrium with synovial membrane. (X 270 cf. figs. 181, 188.)

- A. Perichondrium.
- B. Synovial membrane.

.....

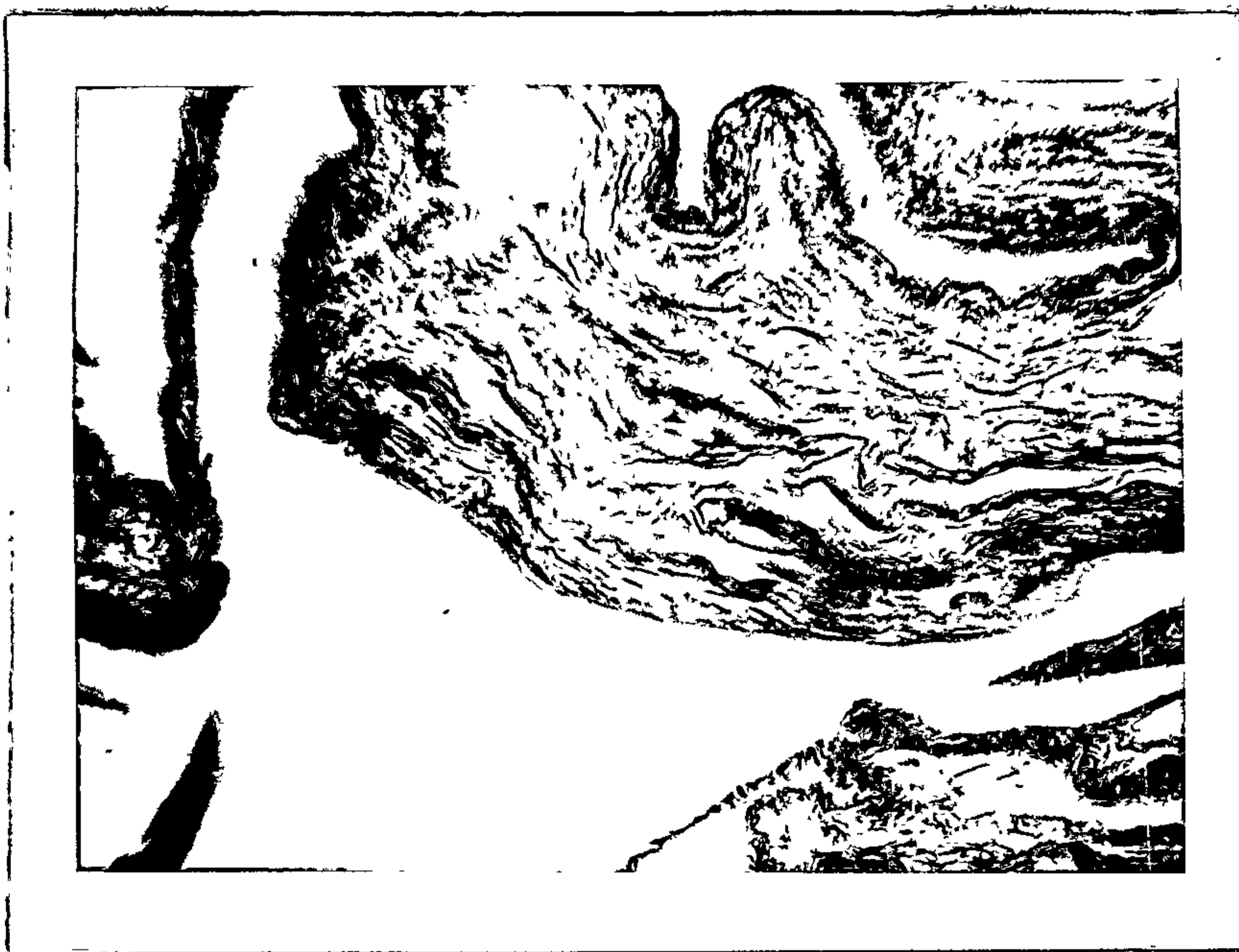


Fig. 190.

Synovial villi at antero-inferior joint cavity. (X 270 cf. fig. 181.)

.....

Pes Menisci. (cf. fig. 181.)

The fibres of the spheno-meniscus muscle are cut transversely and obliquely and its tendons merge with the collagenous fibres of the pes menisci. The collagenous fibres of the pes menisci are orientated in the main parallel with each other and associated with it is a network of anastomosing elastic fibres. The heels of the pes menisci

consists of fairly well orientated collagenous fibres and the cell component of this part of the meniscus is mainly flattened fibroblasts.

The synovial membrane beneath the hila of the pes menisci has already been referred to whilst the synovial membrane on the superior surface of the pes menisci consists of a flattened layer of cells both fibroblastic and chondrocytic in nature. Beneath which, at least anteriorly, is a loose layer of sub synovial connective tissue. This layer decreases posteriorly and is not evident in the region of the most postero-superior part of the pes menisci.

Pars Gracilis Menisci. (cf. fig. 181.)

Consists of fairly well orientated collagenous fibres among which there are a few fine elastic fibres. The cells are fibroblastic and chondrocytic in nature. (fig. 191.) On the superior and inferior surface there is no sub synovial connective tissue. The synovial membrane is reduced to a layer of well spaced fibroblasts and chondrocytes.



Fig. 191.

Pars gracilis menisci. Chondrocytes. (X 900 cf. fig. 181.)

.....
Pars Posterior Menisci. (cf. fig. 181.)

Consists of unorientated collagenous fibres and a few fine elastic fibres and the synovial surfaces are similar to those of the pars gracilis menisci. (fig. 192) In certain places the meniscus is undergoing disintegration and this

disintegration is associated with unmasking of the collagenous fibres and dissolution of the ground substance. In effect the collagenous fibres become unmasked (fig. 193) (fibrillation) the chondrocytes become hypertrophic and their nucleus pyknotic (fig. 194.)



Fig. 192.

Pars posterior menisci. (X 80 cf. fig. 181.)

.....

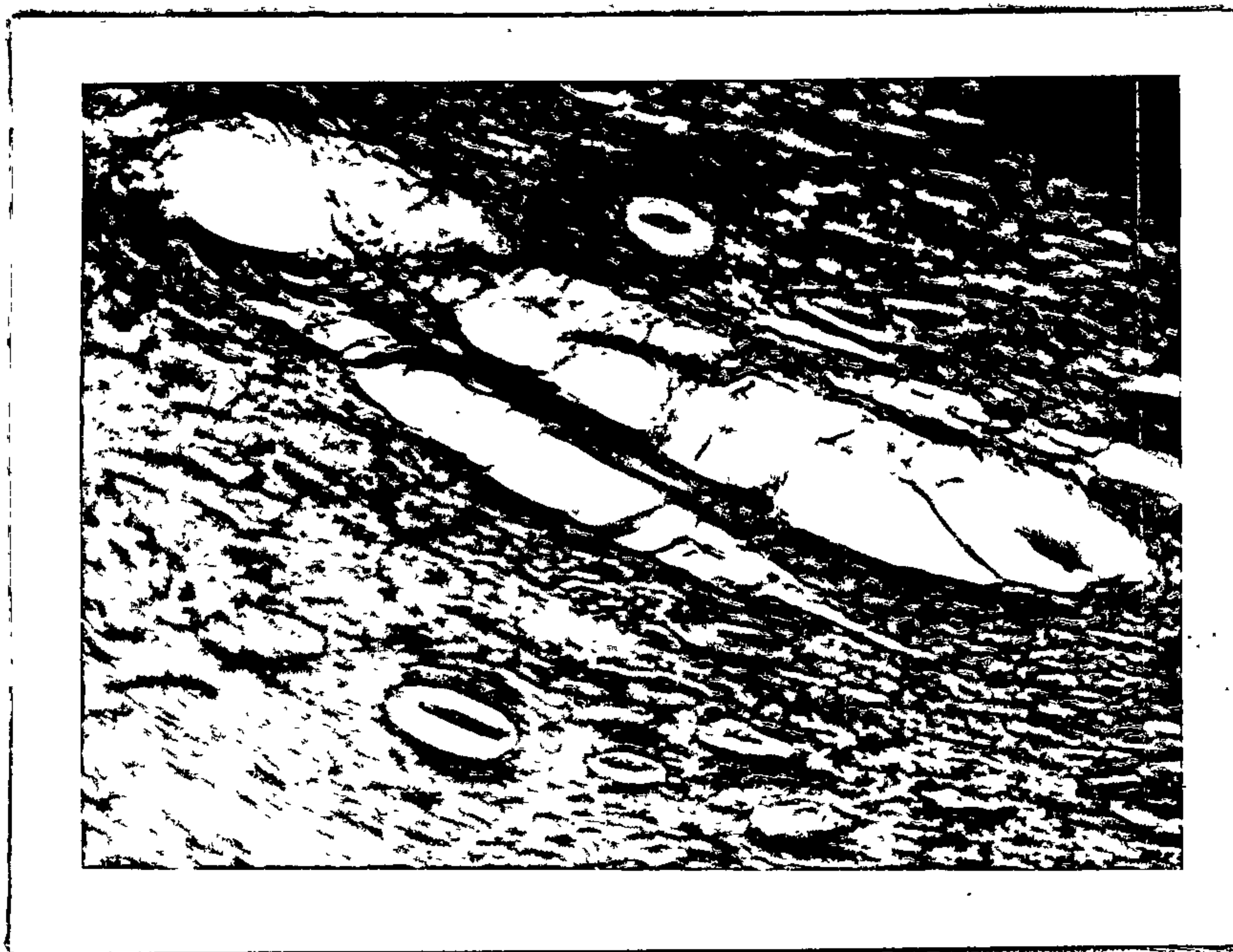


Fig. 193.

Fibrillation in the pars posterior menisci. (X 270 cf. fig. 181.) Note: Hypertrophic chondrocytes and dissolution of ground substance in centre of the field.

.....



Fig. 194.

Hypertrophic chondrocytes in pars posterior menisci.
(X 900 of. fig. 181.)

.....
Superior Stratum. (of. fig. 181.)

This stratum can only be seen in its anterior aspect and it consists of fairly well orientated collagenous fibres and in this section elastic fibres are not prominent. The synovial membrane consists of a layer of fibroblasts packed fairly close together beneath which there is a rather loose layer of vascular connective tissue.

Inferior Stratum. (cf. fig. 181.)

This stratum can be demonstrated quite well in this section and it is seen posteriorly to become continuous with the periosteum of the posterior aspect of the condyle. It consists of wavy bands of collagenous fibres ligamentous in nature among which can be seen a few elastic fibres which appear to form a three dimensional pattern. (fig. 195.) The synovial membrane inferior to inferior stratum consists of a layer of fibroblasts in most cases quite close together and there is an extensive layer of sub synovial connective tissue which contains blood vessels. Some of these blood vessels are very close to the surface. Synovial villi are frequent in this part of the joint cavity. (fig. 195.)



Fig. 195.

Inferior stratum (X 80 cf. fig. 181.)

.....
Bilaminar Zone. (cf. fig. 181.)

This zone consists of fairly loose neuro vascular connective tissue containing an elastic fibre three dimensional network.

Middle third of the Meniscus. (cf. fig. 196.)

The appearance of the meniscus in sagittal section corresponds to that of the preceding section with the exception that the pterygo-condylar area and the pes menisci are somewhat different.

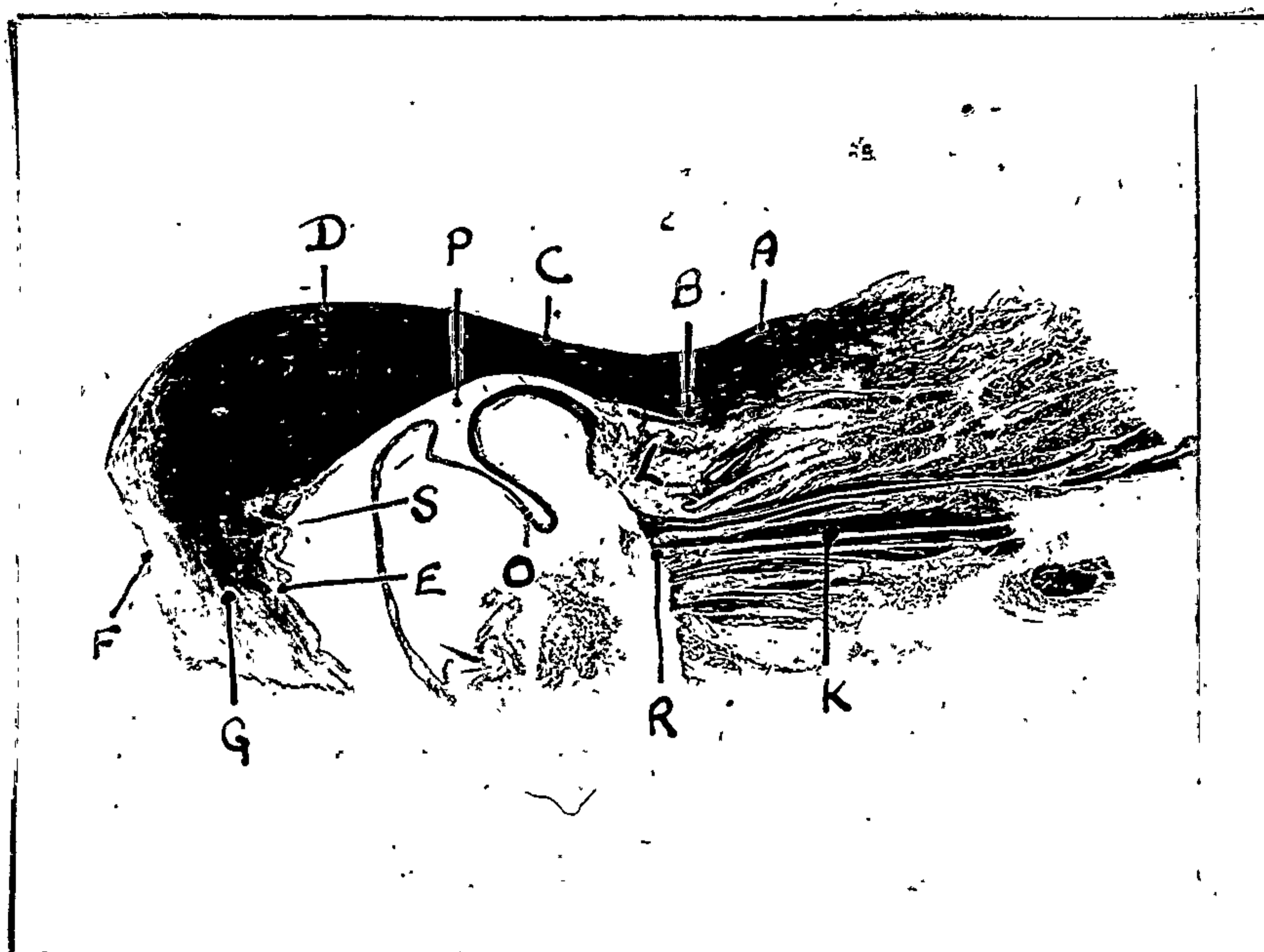


Fig. 196.

Specimen no. 4 - 58 years.

Sagittal section X 5 middle third temporomandibular meniscus.

- A. Pes menisci.
- B. Helix of pes menisci.
- C. Pars gracilis menisci.
- D. Pars posterior menisci.
- E. Inferior stratum.
- F. Superior stratum.
- G. Bilaminar zone.
- K. Lateral pterygoid muscle.
- L. Pterygo-condylar area.
- O. Perichondrium.
- P. Inferior joint cavity.
- S. Genu vasculosis menisci.
- R. Periosteum.

.....

Pterygo-Condylar Area. (cf. fig. 196.)

In this section the boundaries of this area are constituted by the helix of the pes menisci and the inferior fibres of the spheno-meniscus muscle, - the superior boundary. The inferior boundary is constituted by the fibres of the lateral pterygoid muscle, and the base by that part of the periosteum between the inferior boundary of the anterior articular slope of the condyle and the superior margin of the pterygoid fovea of the condyle. It differs from the preceding section in that the helix of the pes menisci is not excluded from the pterygo-condylar area. The area itself consists of loose neuro-vascular connective tissue and exhibits a fairly large vein running latero-medially through it. (figs. 197, 198, 199, 200.)



Fig. 197.

Pterygo-condylar area showing neuro-vascular connective tissue. (X 80 cf. fig. 196.)



Fig. 198.

An epithelioid type arterio-venous-anastomoses in the pterygo-condylar area. (X 270 cf. fig. 196.)

A. Epithelioid type arterio-venous-anastomoses.





Fig. 199.

An epithelioid type arterio-venous-anastomoses in the pterygo-condylar area. (X 900 cf. fig. 196.) Note the corrugated nature of the lumen.

.....



Fig. 200.

An epithelioid type arterio-venous-anastomoses 15 micra medial to fig. 199. (X 900 cf. fig. 196, 198, 199.)

A. Epithelioid cell.

Notes: Sucquet-Hoyer canal.

.....

Pes Menisci. (cf. fig. 196.)

In this section the collagenous fibres of the pes menisci are more orientated than in the preceding section. Medial third of the Meniscus. (cf. fig. 201.)

This medial section of the meniscus is almost the same as the lateral third of the meniscus of this specimen.

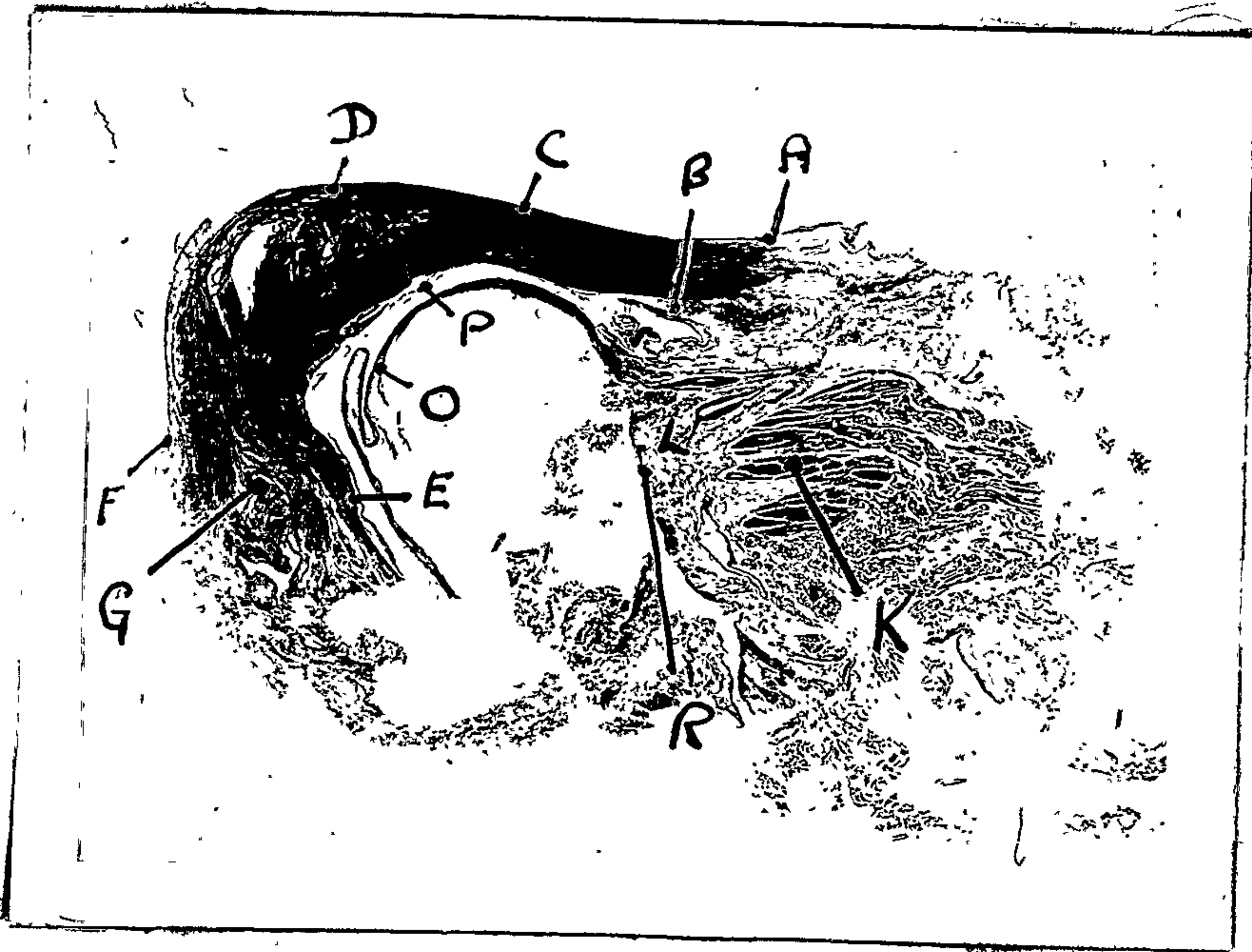


Fig. 201.

Specimen no. 4 - 58 years.

Sagittal section X 5 medial third temporomandibular meniscus.

- A. Pes menisci.
- B. Hele of the pes menisci.
- C. Para gracilis menisci.
- D. Pars posterior menisci.
- E. Inferior stratum.
- F. Superior stratum.
- G. Bilaminar zone.
- K. Lateral pterygoid muscle.
- L. Pterygo-condylar area.
- O. Perichondrium.
- P. Inferior joint cavity.
- R. Periosteum.

.....

SUMMARY.

This specimen resembles the preceding specimens in its morphological and histological features, with the exception that it exhibits fibrillation of the fibro cartilage of the meniscus, which can be regarded probably as atrophic changes associated with aging.

Arterio-venous-anastomoses were noted in the pterygo-condylar area. Atheroma of some of the blood vessels in the bilaminar zone was also noted. Articular cartilage was observed beneath certain areas of the perichondrium of the head of the condyle. This may mean that articular cartilage only persists in certain places on the head of the condyle and has been replaced by bone in other places.

Genu Vasculosis Meniscus.

A similar vascular canal can be seen in this specimen.

(cf. fig. 196.) although no specialised blood vessels were recognised associated with it.