PLATE XXXIV.

FIG. *A*.

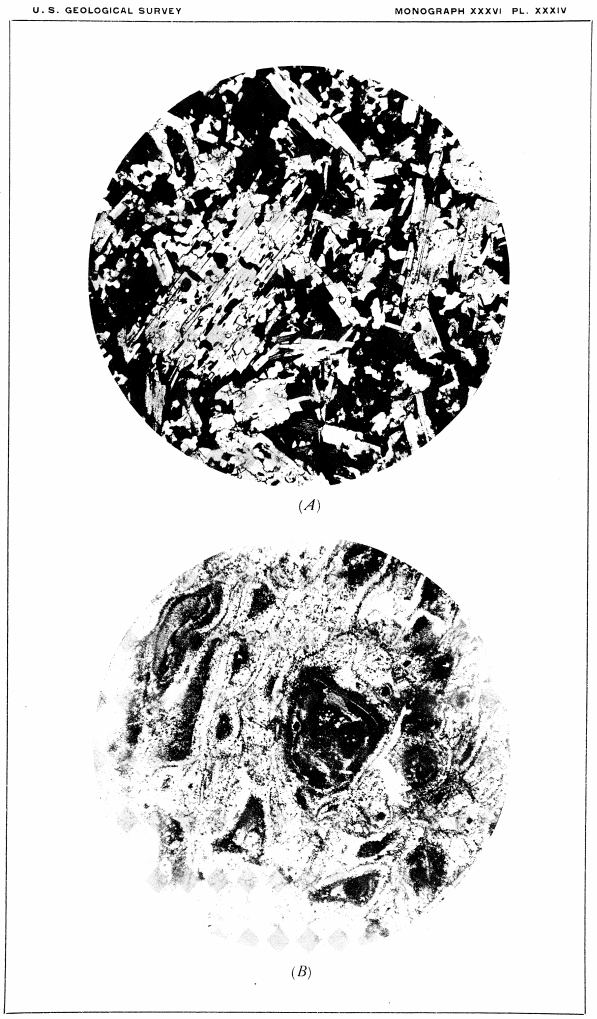
(Sp. No. 23746. Without analyzer, x 17.)

Contact product of a granite. This muscovite-biotite-gneiss (?) is the result of contact action of a granite upon a graywacke. Complete recrystallization of the sedimentary rock has taken place, with the production of a porphyritic schistose structure. The large porphyritic muscovite plates seen as white areas in the photomicrograph evidently represent the last products of recrystallization, as they include all of the minerals which have been previously formed. They are possibly to be looked upon as the product of mineralizers, to whose action may also be referred the presence of tourmaline, which occurs in the section. The irregular white areas represent quartz and feldspar. Dark greenish-brown biotite is included in the muscovite, and with iron oxides occupies the areas which in the figure are dark. (Described, p. 197.)

FIG. *B*.

(Sp. No. 28226. Without analyzer, x 17.)

Photomicrograph showing the brecciated character of the matrix which is at times found between the ellipsoids in the ellipsoidal basalts. In this specimen the schistose character is not so marked as it is at times. (Described, p. 117.)



(*A*) CONTACT PRODUCT OF GRANITE.
(*B*) BRECCIATED MATRIX BETWEEN ELLIPSOIDS.

PLATE XXXV.

FIG. *A*.

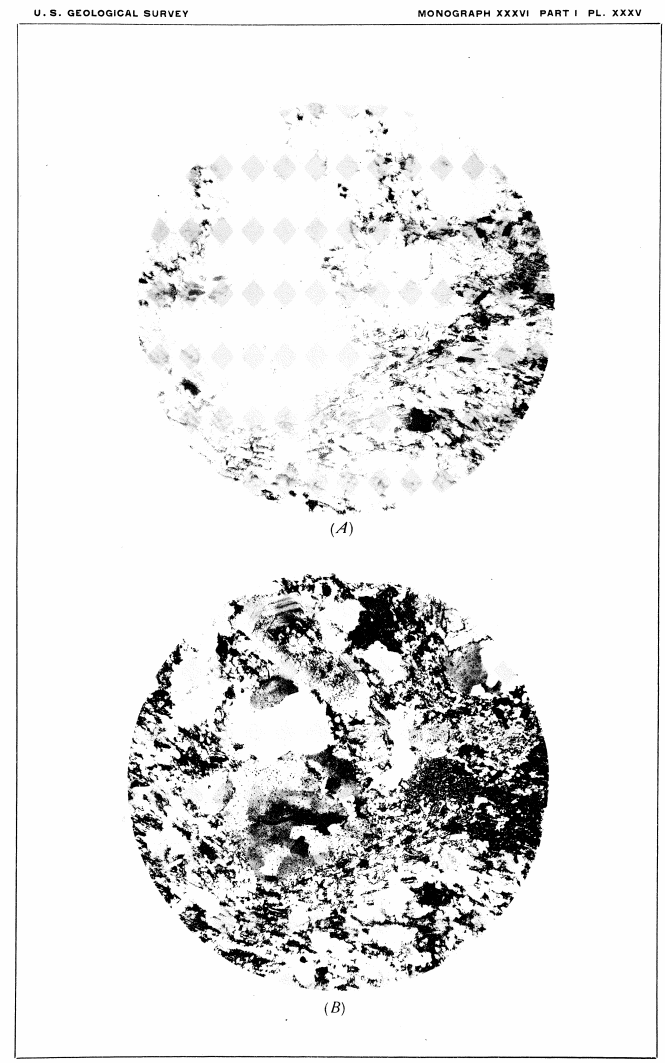
(Sp. No. 26059. Without analyzer, x 18.)

Photomicrograph showing an eruptive contact between granite and metamorphosed sedimentary rock. As a result of this contact the elements of the granite have become partly automorphic. The center of the figure is occupied by a quartz phenocryst which is partly surrounded by the schistose metamorphic product. It contains, near the edge, grains of feldspar and flakes of mica, and thus an imperfect poikilitic zone is produced. The mineral constituents of the metamorphosed sedimentary are arranged parallel to the contours of the phenocrysts. (Described, p. 198.)

FIG. *B*.

(Sp. No. 26059. With analyzer, x 18.)

The same section as the above, viewed between crossed nicols. (Described, p. 198.)



(*A*) CONTACT OF GRANITE AND SEDIMENTARY.
(*B*) CONTACT OF GRANITE AND SEDIMENTARY SEEN BETWEEN CROSSED NICOLS.

PLATE XXXVI.

FIG. *A*.

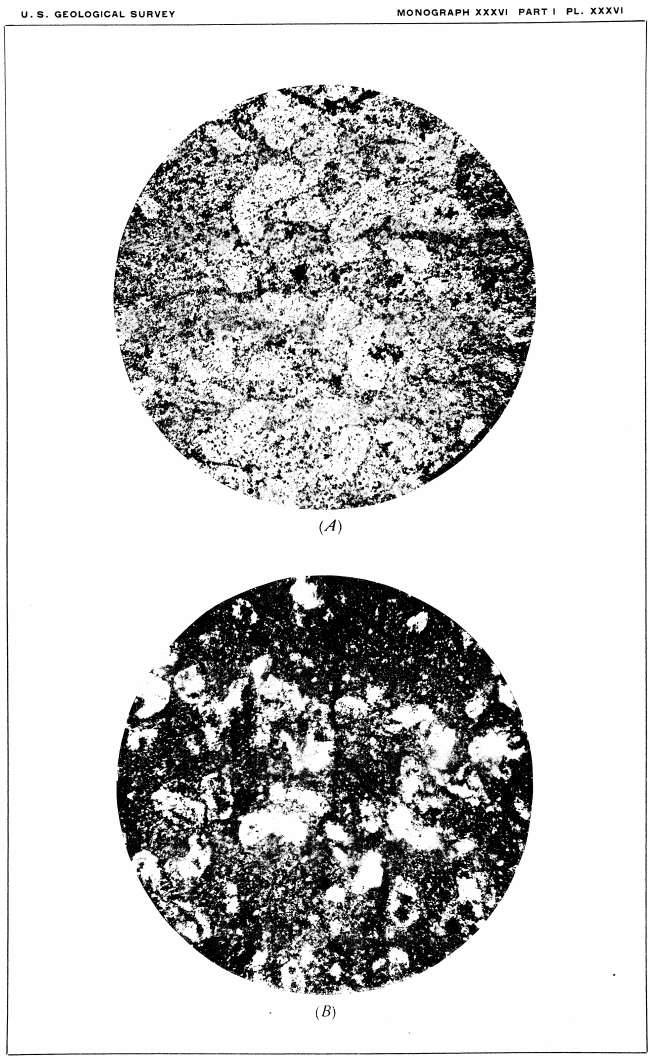
(Sp. No. 32827. Without analyzer, x 38.)

Photomicrograph illustrating a rather exceptional form of spilosite with white spots lying in the fine-grained groundmass. Albite, with a very small amount of chlorite and epidote, forms the spots. (Described, p. 206.)

FIG. *B*.

(Sp. No. 32827. With analyzer, x 38.)

This is the same section as above, viewed between crossed nicols, showing the aggregate character of the spots of this spilosite. (Described, p. 206.)



(*A*) SPILOSITE.
(*B*) SPILOSITE SEEN BETWEEN CROSS NICOLS.

PLATE XXXVII.

FIG. *A*.

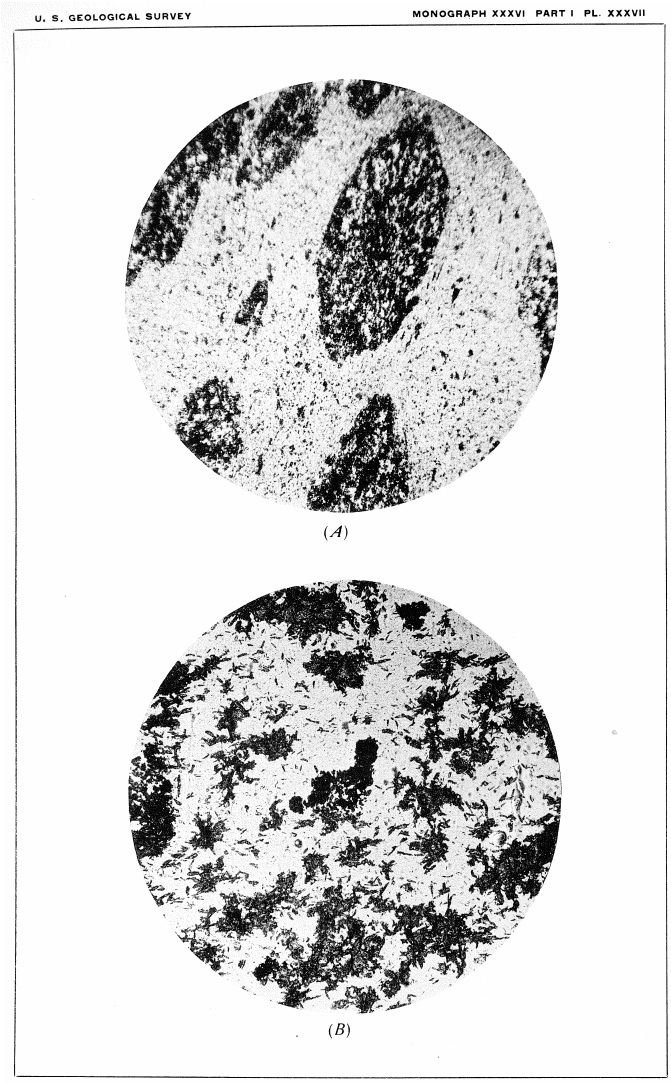
(Sp. No. 32958. Without analyzer, x 18.)

Normal spilosite. Oval spots of macroscopical size, in which chlorite is the predominant constituent, with some quartz, feldspar, rutile, and muscovite, are sharply denned from the surrounding fine-grained groundmass, consisting of the same constituents, but with the muscovite in large quantity and the chlorite very subordinate. (Described, p. 206.)

FIG. *B*.

(Sp. No. 32861. Without analyzer, x 38.)

Spilosite in which the spots are of microscopical size and consist predominantly of chlorite aggregates lying in the fine-grained quartz-albite groundmass. (Described, p. 207.)



(*A*) SPILOSITE.
(*B*) SPILOSITE.

PLATE XXXVIII.

FIG. *A*.

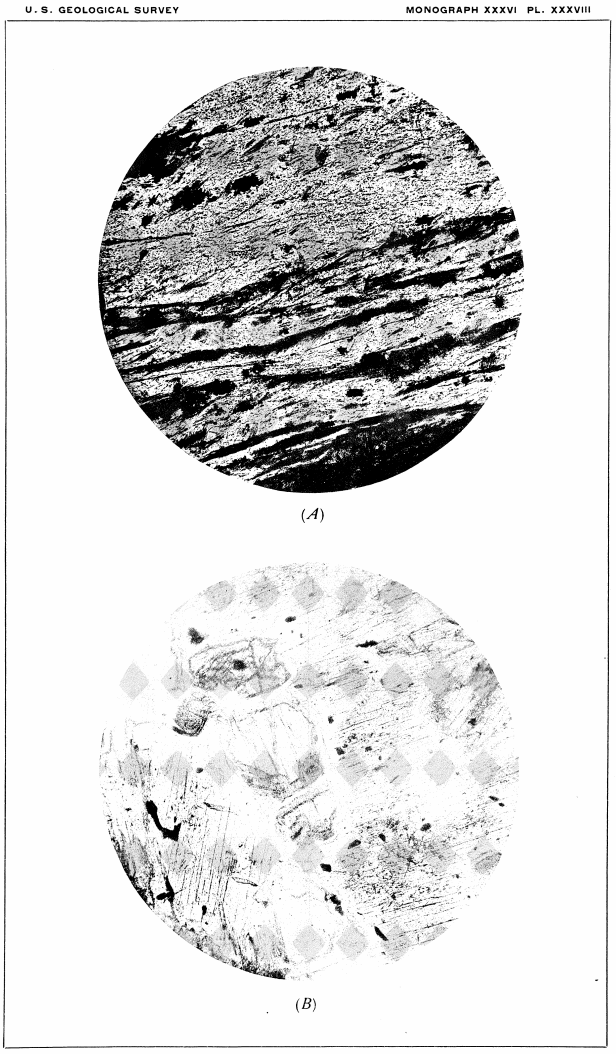
(Sp. No. 32826. Without analyzer, x 38.)

Photomicrograph illustrating the passage of spilosite to a desmosite. In the upper portion, especially in the upper left-hand corner, of the figure., chlorite aggregates similar to those illustrated in fig. By Pl. XXXVII, are seen. These become united, and thus there is a passage into the banded product. This banded character is well shown in the lower half of the photomicrograph. (Described, p. 207.)

FIG. *B*.

(Sp. No. 23755. Without analyzer, x 90.)

Occurrence and alteration of bronzite in bronzite-norite. This illustration shows the way in which the bronzite occurs in the bronzite-norite. It is frequently included in the hornblende. The bronzite alters around the edges and along the cracks to a yellowish-green fibrous serpentine mineral, which is represented in the section by the dark fibrous material next to the unaltered bronzite. This secondary mineral then alters to a scaly aggregate of talc. These two secondary products can be seen bordering the bronzite, especially well where it is traversed by a crack. (Described, p. 238.)



(*A*) PASSAGE OF SPILOSITE INTO DEMSOSITE.
(*B*) ALTERATION OF BRONZITE IN BRONZITE NORITE.

PLATE XXXIX.

FIG. *A*.

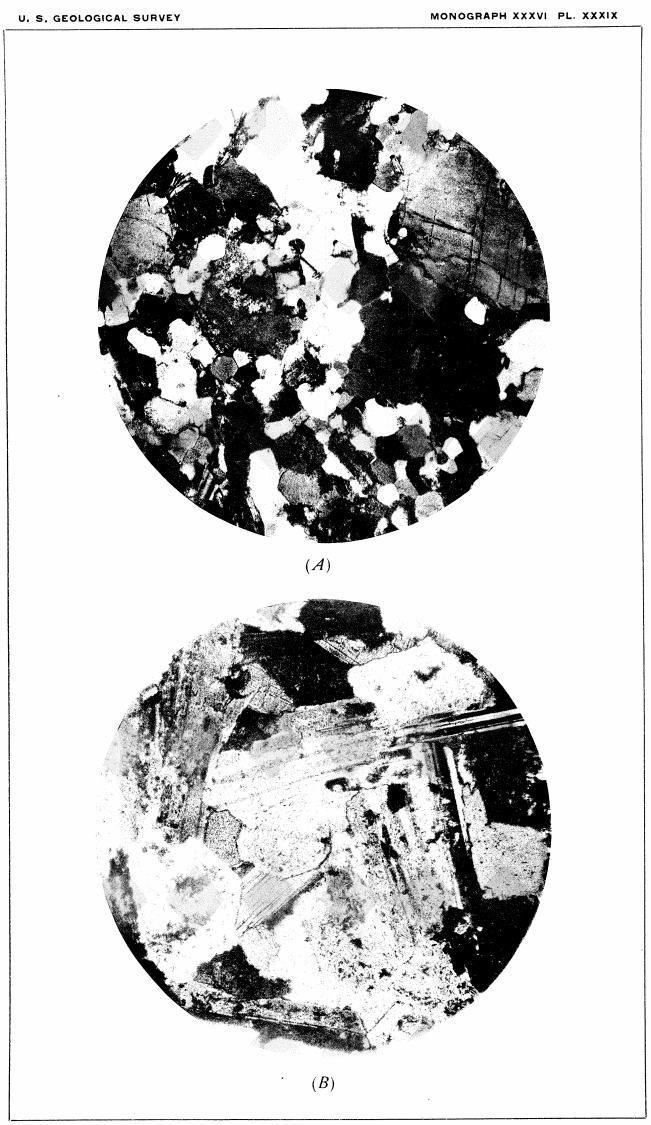
(Sp. No. 23321. With analyzer, x 35.)

Photomicrograph of a section, of biotite-granite from the center of a dike 5 feet wide. On the borders of the dike the magma has crystallized as a normal mica-diorite without quartz and orthoclase. (Described, p. 220.)

FIG. *B*.

(Sp. No. 26023. With analyzer, x 35,)

Mica-diorite showing tendency toward an ophitic texture. Plagioclase is the most automorphic mineral. Biotite is next, but it is poorly developed. Orthoclase and quartz fill irregular areas between the plagioclase. (Described, p. 231.)



(*A*) BIOTITE GRANITE.
(*B*) MICA DIORITE.

PLATE XL.

FIG. *A*.

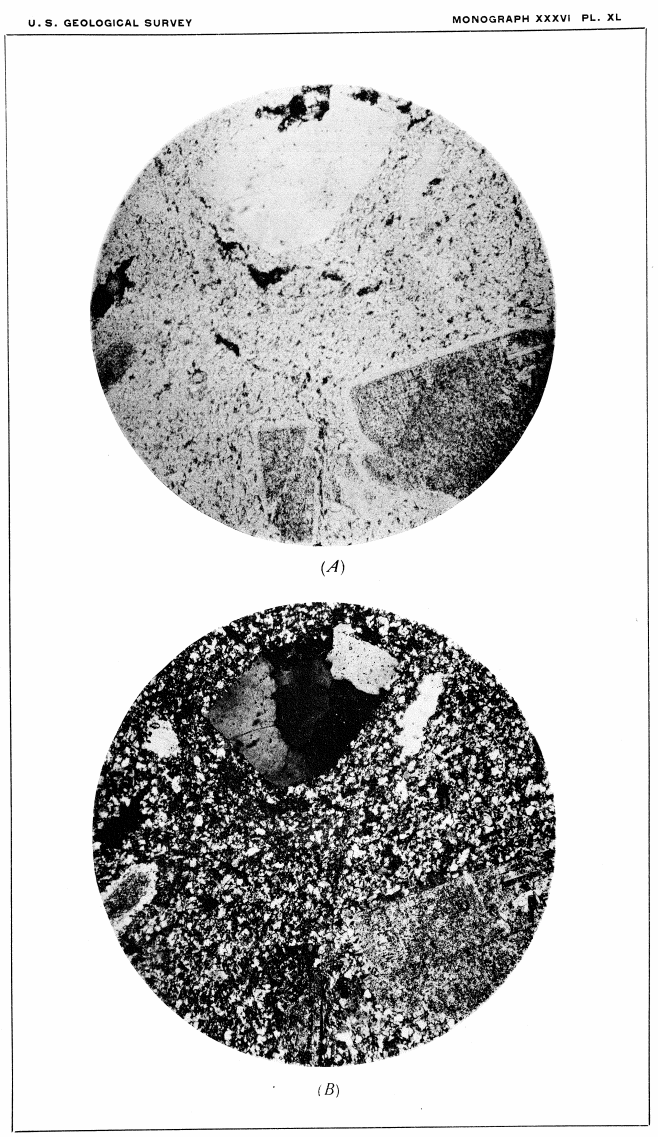
(Sp. No, 32643. Without analyzer, x 35.)

Quartz-mica-diorite-porphyry. The phenocrysts of feldspar and quartz stand out clearly from the fine microgranitic groundmass. Mica phenocrysts are not seen in this figure, which is intended chiefly to illustrate the character of the feldspar phenocrysts. Muscovite has resulted from their alteration. The zone which surrounds the altered center is very fresh, and is rendered poikilitic by inclusions of minute grains of quartz. (Described, p. 229.)

FIG. *B*.

(Sp. No, 32643. With analyzer, x 35.)

Quartz-mica-diorite-porphyry. The same section, viewed between crossed nicols. The micro-granitic texture of the groundmass is well shown. (Described, p. 229.)



(*A*) MICA DIORITE PORPHYRITE.
(*B*) MICA DIORITE PORPHYRITE SEEN BETWEEN CROSSED NICOLS.

PLATE XLI.

FIG. *A*.

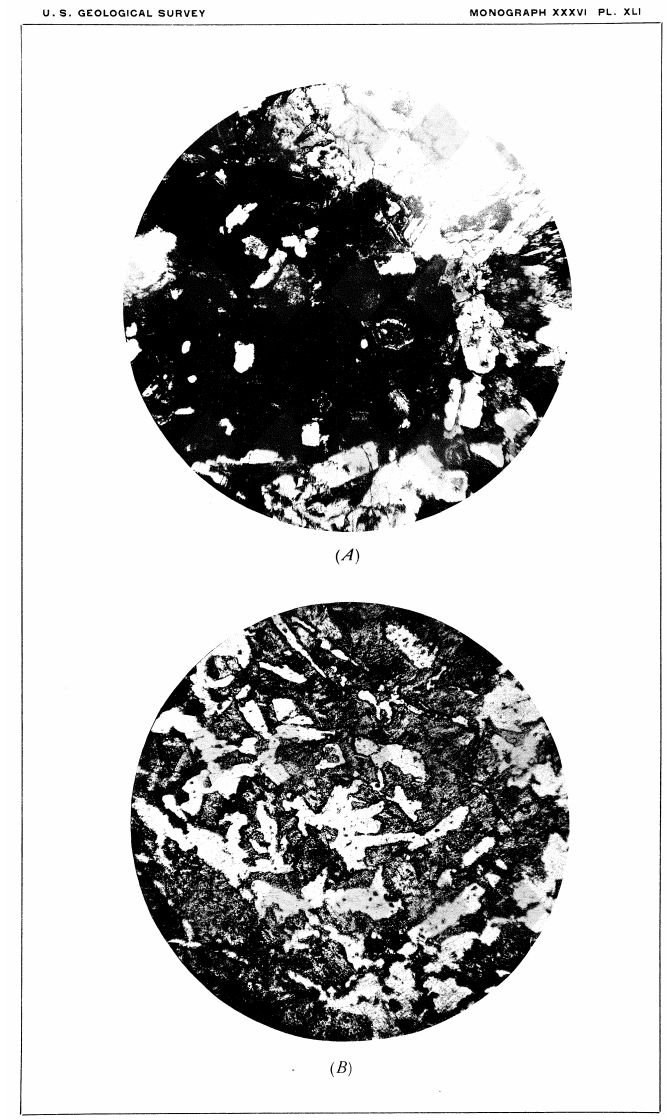
(Sp. No. 23320. Without analyzer, x 18.)

Porphyritic poikilitic hornblende-gabbro. The brown hornblende occupying the center of the phenocryst grades over into a dull-green hornblende. Feldspar and pyroxene are included in the hornblende. (Described, p. 241.)

FIG. *B*.

(Sp. No. 23344. With analyzer, x 18.)

Hornblende-gabbro showing a poikilitic texture. The tendency of the feldspars toward a lath-shaped development is very evident. Were they lath-shaped the texture would agree with the Lévy definition of the ophitic texture. (Described, p. 233.)



(*A*) PORPHYRITIC POIKILITIC HORNBLENDE GABBRO.
(*B*) POIKILITIC HORNBLENDE.

PLATE XLII.

FIG. *A*.

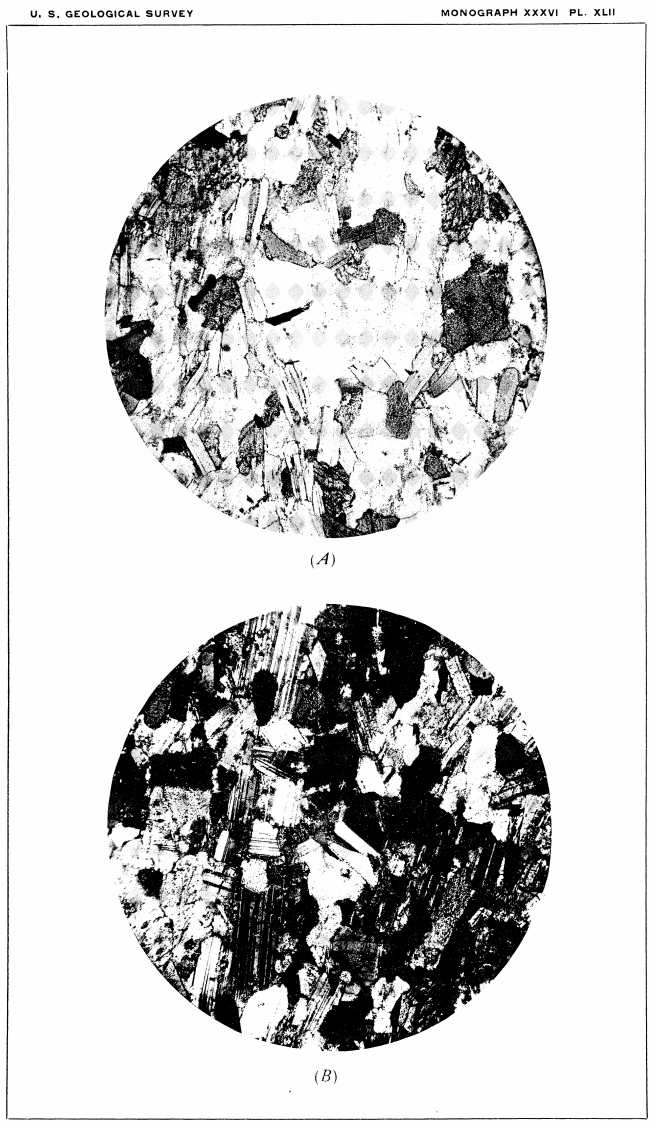
(Sp. No. 23754. Without analyzer, x 38.)

A moderately fine grained hornblende-gabbro allowing parallel texture. This hornblende-gabbro occurs in dikes cutting the coarse forms of hornblende-gabbro. The specimen shows very clearly the parallel texture rather commonly found in sections from these dike rocks. This texture is best developed nearest the contact, and is presumed to be a flow texture. The chief mineral constituents—plagioclase, hornblende, and mica—can be readily distinguished in the section. (Described, p. 244.)

FIG. *B*.

(Sp. No. 23754. With analyzer, x 38.)

The parallel texture in the hornblende-gabbro is brought out somewhat better when viewed between crossed nicols. (Described, p. 244.)



(*A*) HORNBLENDE GABBRO.
(*B*) HORNBLENDE GABBRO SEEN BETWEEN CROSSED NICOLS.

PLATE XLIII.

FIG. *A*.

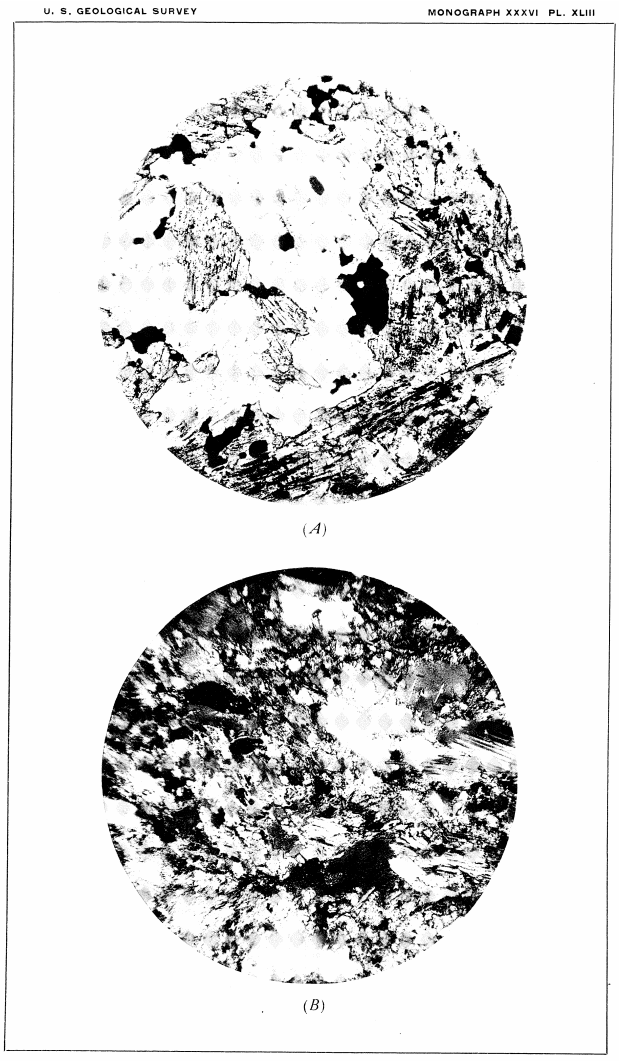
(Sp. No. 26070. Without analyzer, x 17.)

Normal granular hornblende-gabbro. This illustrates the normal medium-grained hornblende-gabbro which occurs in this district. The mineral constituents hornblende, feldspar, and iron oxide can be readily distinguished. (Described, p. 248.)

FIG. *B*.

(Sp. No. 26069. With analyzer, x 18.)

Schistose hornblende-gabbro. This illustrates a crushed specimen of a normal hornblende-gabbro such as is represented above in fig. A. In this the feldspar has been partly granulated, and new feldspar and quartz has resulted therefrom. The hornblende has also to a considerable extent been recrystallized as light-green secondary hornblende. The mica has become chloritized. These are the important secondary products. A very fair schistose structure has resulted from the crushing. Carried to its full extent, metamorphism of this rock would result in producing an amphibolite or a hornblende-gneiss. (Described, p. 248.)



(*A*) COARSE HORNBLENDE GABBRO.
(*B*) SCHISTOSE HORNBLENDE GABBRO.

PLATE XLIV.

FIG. *A*.

(Sp. No. 23319. Without analyzer, x 35.)

Moderately fine grained hornblende-gabbro. The constituents hornblende, plagioclase, and iron oxide can be readily recognized. Many of the hornblende individuals contain a great number of minute inclusions. (Described, p. 240.)

FIG. *B*.

(Sp. No. 23755. Without analyzer, x 35.)

Bronzite-norite. The rock consists of bronzite, hornblende, and plagioclase. The bronzite individuals show a tinge of green and pink, and are slightly fibrous, due to beginning alteration. Cracks, filled with alteration products, cross them. The bronzite is frequently surrounded by a rim of brown hornblende. In some parts of the rock it is partly automorphic. The hornblende can be readily recognized by its strong yellowish and reddish-brown color. It is in anhedra. The plagioclase is the white mineral including numerous minute dark specks. It, like the bronzite, is xenomorphic. (Described, p. 244.)

A. HORNBLENDE-GABBRO.
B. BRONZITE-NORITE.

PLATE XLV.

FIG. *A*.

(Sp. No. 23356. Without analyzer, x 35.)

Bronzite-norite-porphyry. The phenocrysts of bronzite lie in a groundmass of bronzite, monoclinic pyroxene, hornblende, and feldspar. In the drawing the bronzite and monoclinic pyroxene of the groundmass can not be distinguished. (Described, p. 247.)

FIG. *B*.

(Sp. No. 23353. Without analyzer, x 18.)

Feldspathic wehrlite. One can readily distinguish the constituents—augite, hornblende, olivine and feldspar—in the illustration. The augite is autoinorphic where it is near the feldspar. It is surrounded by a brown hornblende zone. Between the olivine and the feldspar there are always two zones. One, the inner one, best seen between crossed nicols, is orthorhombic pyroxene; the other, the outer one, is compact green hornblende. This green hornblende is in optical continuity with the brown hornblende which surrounds the augite. (Described, p. 255.)

A. BRONZITE-NORITE-PORPHYRY.
B. FELDSPATHIC WEHRLITE.

PLATE XLVI.

FIG. *A*.

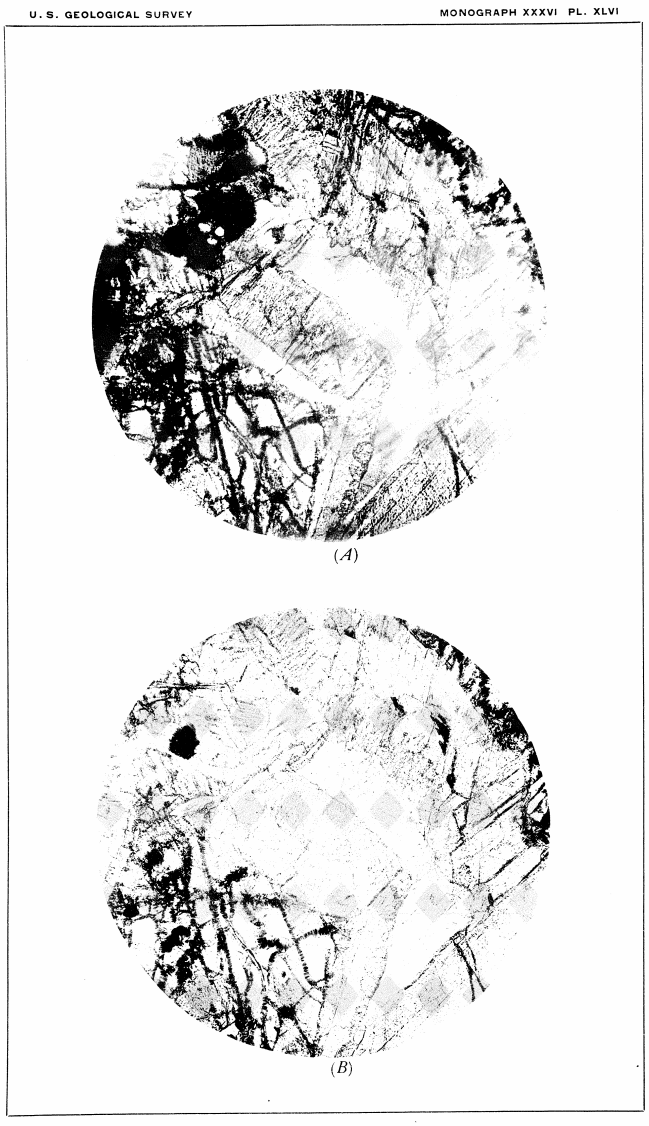
(Sp. No. 23353. With analyzer, x 90.)

Wehrlite. There are shown in this illustration the zones of orthorhombic pyroxene and hornblende which lie; between the olivine and feldspar. (Described, p. 255.)

FIG. *B*.

(Sp. No. 23353. Without analyzer, x 90.)

Wehrlite. The ramifying feldspar growths in the hornblende can be seen better when the section iswiewed with the analyzer in, as in fig. A. (Described, p. 255.)



(*A*) WEHRLITE VIEWED BETWEEN CROSSED NICOLS.
(*B*) WEHRLITE.