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J. KOUŘIMSKÝ – M. KRÁLÍK:

NOVÉ NÁLEZY NEROSTŮ V OKOLÍ MARIÁNSKÝCH LÁZNÍ

NEW FINDS OF MINERALS IN THE VICINITY OF MARIÁNSKÉ LÁZNĚ

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J. KOUŘIMSKÝ — M. KRÁLÍK:

Nové nálezy nerostů v okolí Mariánských Lázní

Новые находки минералов в окрестностях Мариянских Лазни

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I. Nerosty z Křížence.

Osada Kříženec, ležící asi 3 km na severovýchod od Plané u Mariánských Lázní, je známá svými pokusy o těžbu slídy, která se zde loupala již za prvé světové války. Šachta i haldy, které jsou dnes na místě bývalého povrchového lomu, leží na západním okraji obce mezi osadou a silnicí na Výškov.

Horninou je zde světle šedý pegmatit středního až hrubého zrna, často s typickým písmenkovým prorůstáním. Tyto pegmatitové výskyty jsou vázány na blízkost žulové intruse hanovské jízvy a netvoří nikde větší žíly, nýbrž spíše jednotlivá menší tělesa čočkovitého tvaru. Od Křížence pokračuje pegmatitová zona dále severovýchodním směrem přes Hostíčkov a Zhořec až k Berounu mezi Městem Teplou a Bezdružicemi. Křížencký pegmatit, dotýkající se bezprostředně tmavošedé biotitické ruly, představuje vcelku přechod od skutečného pegmatitu k pegmatitovým rulám. Mineralogicky nejzajímavější jsou jeho okrajové partie, ve kterých dochází k značnému obohacení pegmatitového magmatu. Tyto partie jsou také nejbohatší výskyty muskovitu. Sklon k tvoření dutin nebyl v pegmatitu pozorován.

Pegmatit sám je tvořen živcem (perthitický orthoklas až albit), křemenem a muskovitem. Jako akcesorické nerosty se zde vyskytuje granát-spessartin s příměsí almandinové složky, Mn-apatit, zrna pyritu, biotit, turmalin (skoryl) a krystalky dosud blíže neurčeného nerostu, obsahujícího v podstatném množství Zr. Druhotně zde vznikají směsi fosfátů s převládajícím vivianitem, vodnaté kysličníky Mn a Fe a žilky chloritu. Zvláště zajímavé jsou orientované srůsty železitých a manganatých dendritů na lupenech slídy.

Kříženecký pegmatit představuje svým nerostným složením typ pegmatitu, v Čechách poměrně málo běžného. Tato výjimečnost je vyjádřena zvláště přítomností většího množství Mn-granátu a přítomností nerostu, podstatně obsahujícího Zr.

II. Nerosty z Podhornu u Mariánských Lázní.

Vrch Podhorn leží asi 5 km východně od Mariánských Lázní. V současné době se zde pracuje ve dvou čedičových lomech. Horninou je zde olivinický nefelinit a nefelinický basanit. Naleziště je proslulé svými výskyty makroskopických krystalů melilithu. V dutinách čediče vyskytují se dále jehlicovité krystalky apatitu, nefelinu, agregáty aragonitu a kalcitu a povlaky saponitu. V současné době zde byly zjištěny také druhy drobných krystalů natrolithu a phillipsitu, který zde tvoří komplikované prorostlice.

III. Serpentin z Hradišťského vrchu.

Osada Okrouhlé Hradiště leží na jihovýchodním svahu stejnojmenného vrchu na jih od Bezdružic. Dnes se zde láme čedič v lomu na západním svahu kopce při silnici Okrouhlé Hradiště—Konstantinovy lázně asi 1,5 km na severozápad od Okrouhlého Hradiště.

V čediči se nachází olivin, augit a amfibol. Větráním tohoto čediče vznikají celistvé serpentinové partie. Ve výbrusu je patrná nepravidelná síť chrysotilových žilek. Serpentin zde vzniká podobně, jako na jiných nalezištích v oblasti Teplá—Mar. Lázně—Tachov, kde vznikají na mnoha místech hadce větráním olivinem bohatých basických hornin. V dutinách čediče vyskytují se dále kryptokrystalické ledvinité výplně kalcitové.

IV. Vesuvian z Kynžvartu.

Vesuvian byl nalezen ve starém opuštěném lomu na kraji obce za kostelem na jihozápadním svahu Spitzbergu. Vyskytuje se zde ve stébelnatých krystalcích na trhlinách amfibolitu, vyplněných vápencem, spolu s granátem-hessonitem.

Závěrem děkujeme co nejsrdečněji pp. red. K. Kozákovi a RNDr L. Kopeckému za zapůjčení velké části studijního materiálu.

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1. Минералы из Кржиженца.

Село Кржиженец, находящееся приблизительно в трех километрах северо-восточнее Плане у Мариенбада (зап. Чехия), известно своими попытками добывать слюду, которую здесь отщепляли уже во время первой мировой войны.

Горная порода здесь светло-серый пегматит от средней до грубой зернистости, часто с типичным срастанием в виде «письменного гранита». Эти пегматитические образования связаны с близкостью гранитовой интрузии гановского «рубца» и нигде не составляют больших, жил, но, скорее, отдельные небольшие чечевицеобразные формления. Пегматитическая зона от Кржиженца продолжается далее в северо-восточном направлении до самой области между городом Тепла и Бездружицами. Кржиженецкий пегматит, непосредственно касающийся темно-серого биотитического гнейса, в общем представляет собой переход от настоящего пегматита к пегматитическим гнейсам. Минералогически самыми интересными являются его контактные части, где пегматитическая магма богаче. Эти части также самые богатые образованием мусковита.

Пегматит сам образован полевым шпатом, кремнем и мусковитом. Как акцесерические минералы здесь встречаются гранат-спессартин с примесью альмандиновой составной части, Mn-апатит, зерна пирита, биатитит, турмалин (скорил) и кристаллы пока еще не определенного минерала, состоящего главным образом из Zr. Дополнительно здесь возникают смеси фосфатов с преобладанием вивианита, водные окислы Mn и Fe и жилки хлорита. Особенно интересны ориентированные сращения железитых а марганцевых дендритов на пластинках слюды.

Кржиженецкий пегматит представляет собой своими минеральными составными частями сравнительно редко встречающийся в Чехии тип пегматита. Эта исключительность особенно выражена присутствием в большом количестве Mn-граната а так-же и минерала, который содержит главным образом Zr.

2. Минералы из Подгорна у Мариенбада.

Гора Подгорн находится приблизительно в 5 километрах восточнее Мариенбада. В настоящее время здесь работают в двух базальтовых каменоломнях. Горная порода здесь оливиницкий нефелинит и нефелинитический базанит. Это место прославилось находками макроскопических кристаллов мелилита. В полых частях базальта встречаются еще игловидные кристаллы апатита, нефелина, агрегаты арагонита и кальцита, а также пленки сапонита. В настоящее время здесь найдены были и друзы мелких кристаллов натролита и филлипсита, творящего здесь сложные крестообразные срастания.

3. Серпентин Градиштской горы.

Село Окроугле Градиште находится на юго-восточном склоне горы того-же имени, на юге от Бездружиц (северо-западнее от Пильзена). В базальте, добываемом в каменоломне, находится оливин, аугит и амфибол. Выветриванием этого базальта возникают цельные серпентиновые части. На шлифу видна неправильная сеть хризотилических жилок. Серпентин возникает здесь так, как и в иных местонахождениях в области Тепла—Мариенбад—Тахов. В полых частях

базальта встречаются еще и криптокристаллические почковитые кальцитовые заполнения.

4. Везувиан из Кинжварта.

Везувиан был найден в старом ломе на окраине села Кинжварт (северо-западнее Мариенбада), на южном склоне горы Шпицберг. Встречается здесь в стеблевидных кристаллах вместе с гранатом-гессонитом на трещинах амфиболита, заполненных известняком.

New Finds of Minerals in the Vicinity of Mariánské Lázně

I. Minerals from Kříženec

The village of Kříženec lies about 3 km. NE of Planá near Mariánské Lázně, and it is known for the attempts made here to exploit mica. Though mica was peeled here already during World War I hardly any attention had been paid to this locality in the mineralogical or geological literature until recently, apart from a few purely technical reports on the possibilities of using the mica from here in practice, and a few remarks in the German written regional monographs of this area. These monographs are, however, without any greater importance from a mineralogical or geological point of view, as they are more historical than mineralogical and geological.

An article by F. KRATOCHVÍL and J. VACHTL has, however, been published recently-actually while the present communication was being written; — it deals with the pegmatite occurrences of the Kříženec—Nezdice zone of the Teplá Highland (7), solving the geological and petrological questions of the occurrence of pegmatites in this region. Thus my task remains only the mineralogical characterisation of the locality.

The pits and dumps, which are today in the place of the former surface quarry, lie on the western margin of the village, between the settlement and the road to Výškov. The rock is here a light gray pegmatite, medium- to coarse-grained, often with typical graphic intergrowth. These pegmatite occurrences are as stated by KRATOCHVÍL and VACHTL bound to the nearness of the granite intrusion of the Hanov Scar, and do not form anywhere anything like large veins, but occur rather as individual smaller lens-shaped bodies; the thickness of the pegmatite lens at Kříženec does not exceed 15 m. From Kříženec the pegmatite zone continues farther in a NE direction via Hostíčkov and Zhořec to Beroun, between Teplá Town and Bezdružice.

The Kříženec pegmatite borders directly on the dark gray biotite gneiss, but its delimitation is sharp. It represents on the whole a transition from real pegmatite to pegmatite gneisses, with its zones approximately in the same direction as the adjoining gneiss series. In the marginal parts there is a considerable enrichment of the pegmatitic magma, which

shows itself first of all in an increase of the muscovite. Whereas in the graphic pegmatite proper the muscovite occurs only in fine, light yellowish green flakes and larger flakes of mica are rare here, we find in the marginal parts plates of mica up to several cm. thick and of a surface up to 2 dm. Here and there also a fairly large quantity of garnet occurs in these parts, as well as other accessory minerals; quartz increases and feldspar decreases. These parts of the pegmatite are also mineralogically the most interesting ones. No inclination to form cavities was observed.

So far only muscovite, orthoclase and garnet-spessartite have been known from this locality. Now KRATOCHVÍL and VACHTL report some other minerals.

The pegmatite proper is formed by feldspar, quartz and muscovite, where the quantitative ratio of these constituents varies much from place to place. As accessory minerals occur here garnet-spessartite, Mn-apatite, pyrite grains, biotite, tourmaline, and crystals of a so far not more accurately determined mineral containing Zr. Secondarily formed here mixtures of phosphates with predominating vivianite, hydrosilicates of Mn and Fe, and chlorite veinlets.

The feldspar (perthitic orthoclase to albite), forming here often large individuals measuring up to dm., is of a grayish white colour. Relatively frequent is the graphic intergrowth of feldspar and quartz. Feldspar was formerly also extracted at Kříženec as well as in other places of this pegmatite zone, as proved by various abandoned quarries. It is not known exactly when these mines were working.

The quartz occurs here only as a normal structural constituent of the pegmatite. In the slides it often shows an undulatory extinction, especially in the directed parts of the pegmatite. This proves that during crystallisation a rather marked tangential pressure made itself felt, which caused the above-mentioned parallel structure to approaching an orthogneissic character, especially in the marginal parts of the pegmatite body. As recorded by KRATOCHVÍL and VACHTL it came during this tectonic bending also to a change in the strike of the strongly folded series from the general strike of the Hanov Intrusive Scar to a WE strike.

The muscovite forms in the pegmatite fine flakes to plates of considerable size. Even though the occurrence is on the whole rich in mica, its total content in the rock varies greatly from place to place. As already said the marginal parts of the pegmatite are richest where the muscovite occurs in large lamellas and plates (fig. 3), as they are characteristic for the West Bohemian pegmatites in general. The plates have rather often irregular crystal boundaries approaching a hexagonal or rhombic outline, and are unequally elongated. Thicker plates, as reported by MOHR (10), are translucent with raspberry colour. Fort the rest they are usually coloured rusty by iron-pigment, especially in the more strongly weathered parts and at the contact between pegmatite and gneiss. Ferruginous and manganate dendrites penetrate very often directed the individual mica lamellas (fig. 4), enclosing angles of 30^0 and 60^0 as it is usually the case on mica plates from Bengal localities.

Often the mica lamellas are disturbed by pressure, bent or finely crumpled.

Accessory minerals: The garnet-spessartite is the most abundant accessory mineral of the Kříženec pegmatite. J. KRATOCHVÍL (1) is the first author to report on it from this locality, after two specimens in the collections of the Mineralogical Department of the National Museum in Prague (inv. nos. 25 984 and 25 985). They are minute, strongly weathered crystals of a rusty reddish brown colouring, disseminated in the pegmatite. Silicates of Mn and Fe when freed stain dark brown to black the surrounding parts of the rock. These two specimens were collected by L. SLAVÍKOVÁ in 1932.

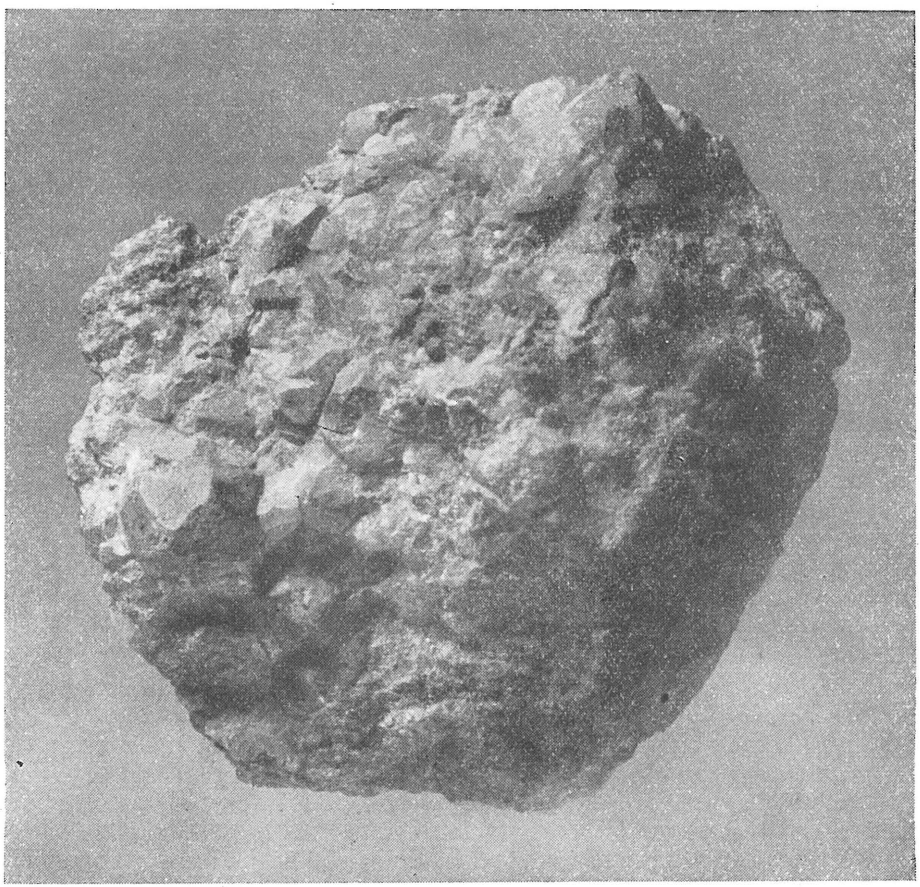

Fig. 1: Group of crystals of garnet-spessartine from Kříženec (Collection of Director K. Kozák, Radošovice near Říčany).

At present we find here pretty rosy crystals of this garnet forming at the margins of the pegmatite up to continuous garnet portions. The garnets have perfect crystal boundaries with garnet-shape faces

(110) (fig. 1). The colour shades and the products of weathering show that we have here obviously spessartite with a considerable isomorphic admixture of a ferruginous almandine component. Its composition varies, however, considerably from place to place. With the increasing size of the crystals the perfection of the crystal boundaries usually decreases so that we often find unequally developed large crystals. The largest crystal found measures 7 cm.; its faces are, however, very imperfect.

The garnets have often roughtly parallel cracks very reminiscent of cleavage. But the slides show that it is only a case of cataclasm. A large part of the garnet shows an anomalous double refraction, and also in the surrounding quartz we can often observe an undulatory extinction. This indicates that the tangential pressure on the pegmatite series was so great that the cohesion of the garnet was exceeded, and the garnet was cracked by numerous parallel cracks.

The Mn-apatite forms tiny columnar crystals and abundant minute, emerald green to bluish green granules.

The pyrite occurs here in coarse, strongly swelling grains.

The biotite occurs only in lathes of lesser measurements. Its flakes occur relatively rarely within the graphic pegmatite. It was found in fairly large quantities only at the margin of the pegmatite body.

Tourmaline. Only once an imperfectly bounded crystal of scoryle was found, grown into feldspar.

In the parts rich in garnet of the pegmatite occur rather abundantly minute to 5 mm. large crystals of grayish brown to black colour, containing as an essential component Zr. A separate note will be published later on this mineral.

The secondary minerals were formed partly recently, partly they were formed directly by the hydrothermal part metamorphism of the rock (lower temperatured stage according to SHAND). According to KRATOCHVÍL and VACHTL (7) this hydrothermal metamorphism occurred already at the time of the tectonic movements which affected the pegmatite body.

Phosphates. The crystals of garnet are rather often covered with a yellowish film. This proved by chemical investigation to be phosphate. Grayish blue phosphate portions occur also within these garnet portions. Under the microscope the phosphate appears in the form of granular, almost submicroscopically crystal aggregates.

Refractive index $n_{Na} = 1.610—1.620$.

These values approach the values of vivianite. It was not possible to determine accurately the refractive indices for the different crystal-optical directions because of the very tiny measurements of the individual crystals. Within the aggregates numerous opaque metal grains were ascertained, reminiscent of magnetite. Both phosphates mentioned were formed obviously by the decomposition of the garnet.

In many places, especially in the marginal parts of the pegmatite, more strongly hydrothermally metamorphosed, we find numerous infiltrations of iron and manganese solutions. The limonite or psilomelane dendrites on the mica lamellas are specially interesting.

The chlorite forms narrow veinlets partly in the weathered parts of the feldspar and partly in the cracks of the garnet. Its flakes are particularly well visible in the slides.

By its mineral composition the Kříženec pegmatite represents a type of pegmatite which is on the whole unusual in our country. This is expressed especially by the presence of a fairly large amount of Mn-garnet and by the presence of numerous crystals of a mineral containing essentially Zr.

Fig. 2: Pegmatite from Kříženec. × nicols, 50 × nat. size (Coll. Min. Dep. Nat. Mus., Prague, inv. no. 9252).

II. Minerals from the Podhorn near Mar. Lázně.

The locality lies about 5 km. east of Mar. Lázně. At present two basalt quarries are worked here. According to Dr. L. KOPECKÝ's determination (oral communication) the rock is here an olivine nephelinite

(nepheline basalt according to the old terminology of HIBSCH) and nepheline basanite.

A report on the present state of the locality known for the occurrence of macroscopic melilite has already been published (6). In that article was also given as a new mineral for the vugs acicular natrolite with refractive indices for sodium light ($n_{\alpha-\beta} = 1.481$, $n_{\gamma} = 1.493$) corresponding completely to the data in the literature for pure natrolite without isomorphous admixture.

J. KRATOCHVÍL (1) records from Podhorn a number of minerals, among others mesolite, gismondine, apophyllite, chabasite, and phillipsite, described by A. HIMMELBAUER (4). As phillipsite was found here at present again in good vugs formed by tiny crystals, and as nothing is said about the present state of the locality, I shall deal with this here.

The crystals are hyaline to white, translucent and of a glassy lustre. They are always compound penetration twins formed of four individuals, which is the relatively most frequent type of phillipsite twins. The reentering angles formed are further filled so that apparently tetragonal columns result, terminated by an apparent pyramid. These faces show a typical pinnate grooving. No other forms of crystals and no other kinds of twinning were ascertained in the material collected.

The refractive indices of the phillipsite examined ($n_{Na} = 1.497$—1.502) approach the data given in the literature for this material. It was not possible to determine accurately the refractive indices of the different crystallo-optical directions because of the different orientation of the different lamellas composing the apparent crystals.

On the vugs of phillipsite grow isolated aggregates of minute white crystals of natrolite, of an almost silky lustre. The individuals, pseudotetragonally symmetric, are up to 1 mm. in diameter, long-columnar, bounded by prismatic faces and terminally ended by a low pyramid.

III. Serpentine from the Hradišťský Vrch.

The locality is given in the literature under the name of Okrouhlé Hradiště. This village lies on the SE slope of the hill of the same name south of Bezdružice. The earliest record in the literature is HALLASCHEK's report of 1816 (2), who speaks of basalt with olivine and augite from the foot of the Hradišťský Vrch. LIDL's report (8) is more detailed; he mentions already two kinds of basalt, a massive kind and a granular one, and expresses an opinion about its origin. The crystals of augite he says equal completely in size and perfection the augites from the Vlčák near Černošín, and he gives their locality as the western slope of the hill and the middle part of the southern slope. ZEPHAROVICH (12) as well as KLVAŇA (5) evidently based their topographic mineralogies on LIDL's report. MAIER (9) lists amphibole as a further mineral from this locality.

Today basalt is here quarried in a quarry in the western slope of the hill near the road Okrouhlé Hradiště. — Konstantinovy Lázně, about 1.5 km. NW of Okrouhlé Hradiště.

Massive serpentine portions of a grayish green colouring are formed by the weathering of this basalt. Thin veinlets of transversally fibrous chrysolite are visible in the slide; they intersect under different angles, and thus form an irregular network in the very minutely fibrous to granular serpentine groundmass (fig. 5). This structure as well as the sporadic remnants of olivine show that the serpentine was formed here by the weathering of olivine portions in the basalt. The origin and occurrence of the serpentine are here therefore similar as in other localities in the area Teplá—Mar. Lázně—Tachov, where serpentine is formed in many places by the weathering of basic rocks rich in olivine.

In the hollows of the basalt occur further cryptocrystals of a reniform calcite filling, grayish in colour, partly zonally stained (fig. 6).

IV. Vesuvian from Kynžvart.

Vesuvian was found in an old, abandoned quarry at the margin of the village beyond the church, in the SW slope of the Spitzberg. It occurs here in fissures of the amphibolite filled with calcite together with garnet-hessonite. It forms granular portions of a brown colour and has a dull glassy to greasy lustre. From the matrix stand out minute, at most 5 mm. long, columnar to long-columnar crystals bounded by faces of the tetragonal prism. The terminal ending was not ascertained. The refractive indices as well as the double refraction are somewhat lower than those usually given in the literature for vesuvians from most localities:

$$\left.\begin{matrix} N_\varepsilon = 1.713 \\ N_\omega = 1.714 \end{matrix}\right\} D = -0.001$$

The constants given were ascertained refractometrically with the use of immersion oils for sodium light. Double refraction and character of the length are slightly negative. Pleochroism, mentioned by some authors, was not observed.

The vesuvian is here accompanied by another typical contact mineral, honey-brown hessonite in lumps.

Translated by Doc Dr Moscheles.

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EXPLANATION OF PLATES.

Fig. 3: Large, here and there brown coloured cleavage plate of muscovite from Kříženec (Collection of the Mineral. Dep. of the National Museum, Prague, inv. no. 37 994).

Fig. 4: Limonite and psilomelane dendrites on a muscovite lamella from Kříženec (Ibid., inv. no. 37 990).

Fig. 5: Thin veinlet across fibrous chrysotile in the granular serpentine matrix from the Hradišťský Vrch. × nicols, 20× nat. size.

Fig. 6: Radiating structure of the calcite in the basalt cavities of the Hradišťský Vrch. × nicols, 20× nat. size.

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V ZÁŘÍ 1952 VYDALO SVÝM NAKLADEM V POČTU 1100 VÝTISKŮ NÁRODNÍ MUSEUM V PRAZE - VYTISKLA STÁTNÍ TISKÁRNA, N. P. 01. - CENA BROŽOV. VÝTISKU 22·50 Kčs

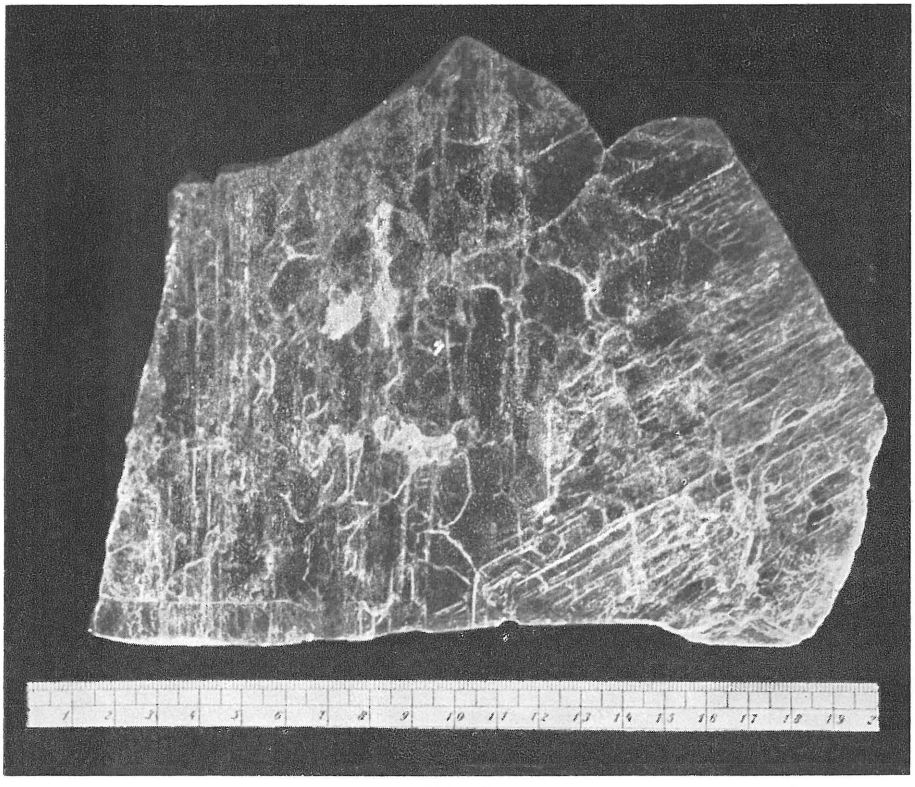

Fig. 3.

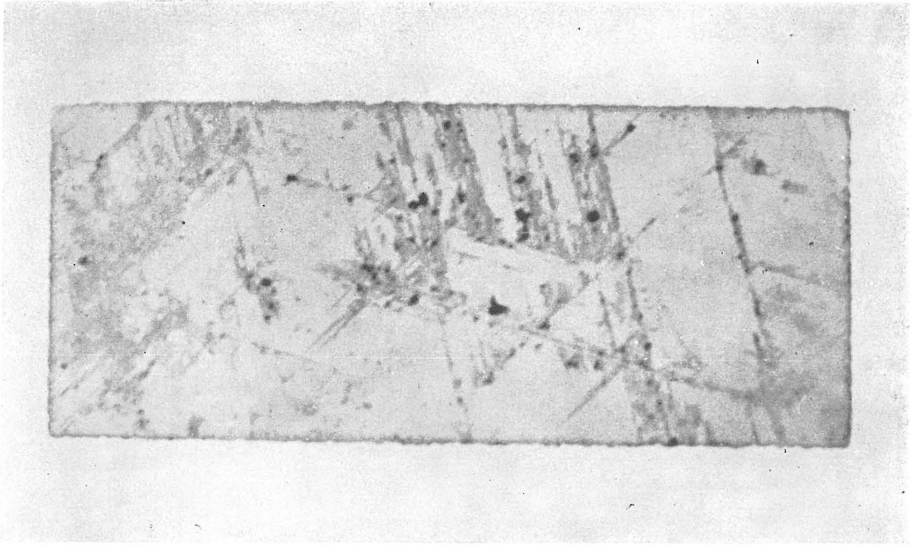

Fig. 4.

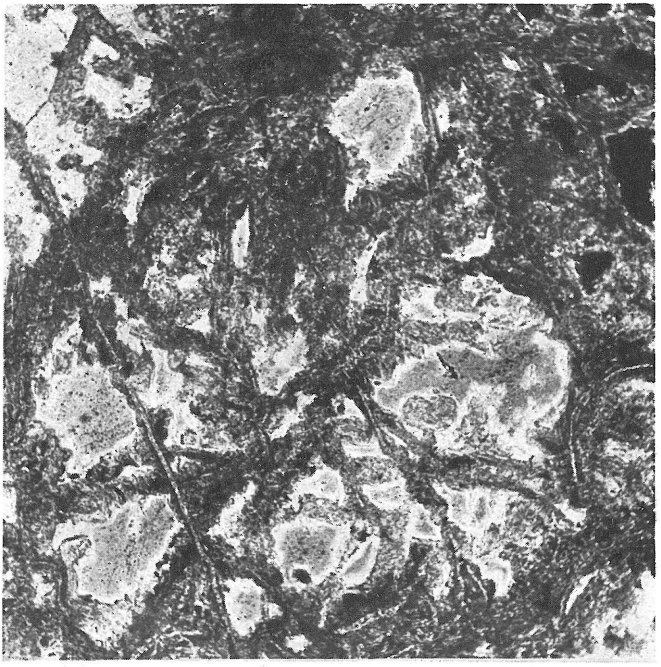

Fig. 5.

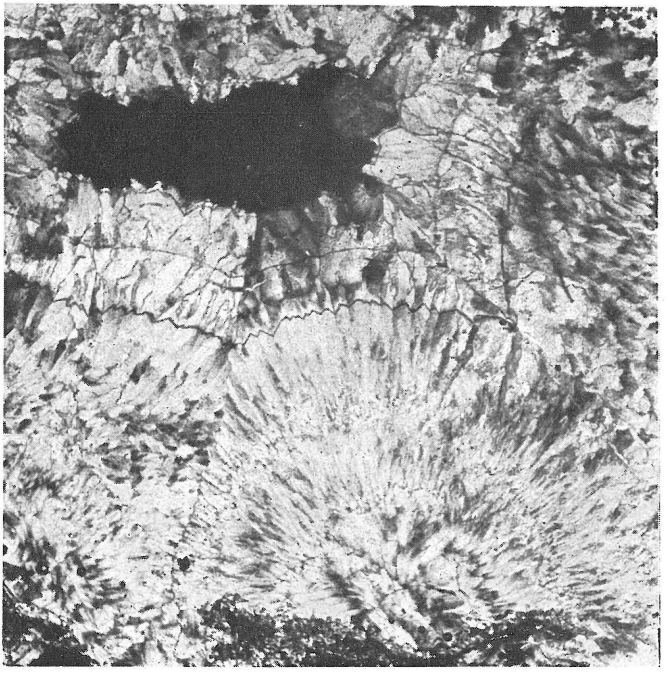

Fig. 6.