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Photo on the cover: Leontopodium alpinum on the limestone. Tatra Mountains, Poland. Author: Tomasz M. Karpiński

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Journal of Biology and Earth Sciences

MEDICINE CASE REPORT

Supernumerary teeth in clinical practice

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ABSTRACT

Introduction: Hyperdontia is the condition of having supernumerary teeth, or teeth which appear in addition to the regular number of teeth. The prevalence rates of supernumerary teeth in the permanent dentition amounts 0.1-6.9%, and in deciduous dentition 0.4-0.8%. The presence of supernumerary teeth can be found in everyday dental practice.

Case presentation: We describe 3 cases of patients with supernumerary teeth. First patient had supernumerary lateral incisor 12s, second - premolar fused, multicuspid, supernumerary deciduous tooth 64s of having several interconnected roots, and third - erupted odontoma between teeth 13 and 14. In all cases treatment involved the removal of the supernumerary tooth.

Conclusions: The decision on proceeding with the supernumerary teeth should be based on the full clinical picture and interview. Early diagnosis and removal of supernumerary teeth allow to avoid or reduce possible complications.

Key words: Hyperdontia, supernumerary teeth, supernumerary incisors, fused teeth, odontoma.

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INTRODUCTION

Hyperdontia is a rare alteration of odontogenesis defined as the presence of any tooth or tooth substance in excess of the normal dental formula.

The prevalence rates of supernumerary teeth in the permanent dentition, reported in the literature, vary between 0.1 and 6.9% [1-6]. In deciduous teeth, prevalence is lower amounting to 0.4-0.8% [4-7].

The presence of supernumerary teeth may be part of developmental disorders. The most common syndromes that show a significant incidence of multiple supernumerary teeth are cleft lip and palate (16.7% of patients) [8], Gardner's syndrome [9] and cleidocranial dysostosis [10].

Sexual dimorphism in hyperdontia is reported by most authors, with males being more commonly affected. The reporting rates of between 1.1:1 and 6.5:1 are depending on the respective population [1, 3-6, 11-13].

Supernumerary teeth are classified according to their morphology and location. In the permanent dentition, there are four different morphological types: conical, tuberculate, supplemental and odontoma [7].

Area particularly predisposed to the formation of the supernumerary teeth is the maxillary anterior region. The most often supernumerary teeth are observed in the central incisors region (so-called mesiodens). Backman and Wahlin make known, that in the chosen Swedish children population as much as 78% of supernumerary teeth are mesiodens [14]. According to studies in the general population they appear in 0.15-1.9% [3-6, 14-16]. Next in relation to the occurrence frequency are supernumerary premolars (0.034-0.84% of the population) [3-6, 17]. Supernumerary teeth in the molar region are usually rudimentary paramolars or distomolars [18-20]. Fourth molars are very rare disorder relating to the teeth number and usually their presence is noticed not until on the radiographs [3, 6, 21, 22].

CASE PRESENTATION

Case 1

An 13-year-old female presented with an erupted tooth on the palate. The patient, despite his young age, pay attention to the health and appearance of their teeth. This tooth was a supernumerary lateral incisor 12s situated palatally just outside the arch. At the same time was a slight rotation of teeth 11 and 12 (Fig. 1). Treatment involved the removal of the supernumerary tooth. The patient was referred for further orthodontic treatment.

Fig. 1. Case 1 - supernumerary lateral incisor 12s situated palatally.

Case 2

An 7-year-old female was referred by the orthodontist to extract the premolar supernumerary 64s deciduous tooth (Fig. 2). The tooth was located vestibularly. At the same time deciduous premolars 64 and 65 were moved in the palatal direction. Treatment involved the removal of the supernumerary tooth. Tooth 64s had features of fused, multicuspid tooth of having several interconnected roots.

Fig. 2. Case 2 - extracted supernumerary fused, deciduous premolar 64s.

Case 3

An 24-year-old female reported for the purpose of re-endodontic treatment of tooth 14. In a clinical examination, between teeth 13 and 14, found a small additional tooth, which was defined as

odontoma (Fig. 3). The diagnosis of odontoma was confirmed by X-ray photograph and after-extraction examination. Treatment involved the removal of the odontoma, next endodontic treatment and prosthetic restoration of tooth 14.

Fig. 3. Case 3 - radiogram of erupted odontoma between teeth 13 and 14.

DISCUSSION

The etiology of hyperdontia is not completely understood. Various theories exist. One theory suggests that the supernumerary tooth is created as a result of a dichotomy of the tooth bud. Another theory, suggests that supernumeraries are formed as a result of local, independent, conditioned hyperactivity of the dental lamina. Heredity may also play a role, because supernumeraries are more common in the relatives of affected children than in the general population [23, 24].

The cases described above represent a small sample of the possible presentations for cases involving supernumerary teeth. Most cases of supernumerary teeth does not give clinical symptoms, they are detected during radiographic examination, incidentally [25]. Supernumerary teeth may erupt regularly in the oral cavity or be retained in the jaw. Eruption frequency is reported to vary between 15 and 34% in the permanent dentition [26], while in the milk dentition about two-thirds of the supernumeraries erupt [26, 27]. In case of our patients all supernumerary teeth were erupted.

Supernumerary teeth may cause the following clinical problems: failure of eruption, displacement or rotation, crowding, abnormal diastema or premature space closure, dilacerations, delayed or abnormal root development of permanent teeth, cystic formation and ectopic eruption [7, 11, 18, 19, 23, 27-31]. Our patients had supernumerary teeth exclusively in maxilla, with predilection for the anterior and premolar region. At the same time in each of these cases noted clinical problems, particularly rotation or displacement of surrounding teeth.

Supernumerary teeth are more often found in males than females [1, 3-6, 11-13]. In our study all patients were female. It is possible that females compared to males, more likely report to the dentist, noting abnormal appearance of the teeth and wanting to improve this.

One from our patients (Case 3) had supernumerary tooth diagnosed as odontoma. Odontoma is a category of supernumerary teeth, not universally accepted. Odontomas are benign odontogenic tumors composed of enamel, dentine, cement and pulp tissue. They are usually clinically asymptomatic, but often associated with tooth eruption disturbances. In exceptional cases the odontoma erupts into the mouth [32], and such exception was at our patient.

Treatment of hyperdontia depends on the respective case. In all cases of our patients supernumerary tooth extraction was performed. In the permanent dentition with regard to the possible complications it is advisable to remove supernumerary teeth, including those not erupted [18, 19]. In cases of normal eruption and settings of supernumerary teeth, when they do not cause disturbances of the arc regularity it is possible to desist from this rule.

The final decision about the need to remove should undertake the physician, after clinical and radiographic image consideration. Therefore, prior to treatment should be performed panoramic radiogram, and in case of doubt additionally dental or occlusal X-ray.

CONCLUSIONS

The decision on proceeding with the supernumerary teeth should be based on the full

clinical picture and interview.

Early diagnosis and removal of supernumerary teeth allow to avoid or reduce possible complications.

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Journal of Biology and Earth Sciences

EARTH SCIENCES ORIGINAL ARTICLE

Petrographic characteristics of rocks with magnetite deposits of Vrbno (Jesieniki - Czech Republic)
Petrograficzna charakterystyka skał ze złoża magnetytu z Vrbna (Jesieniki - Czechy)

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ABSTRACT

Introduction: The subject of this paper is a study the metamorphite shists from the old mines around the Mala Moravka-Karlova Studianka in which is magnetite ore, with ferrous chlorites present.

Materials and methods: Samples were taken directly from the reservoir and the surrounding of the ore, then the samples were observed in the microscope in transmitted and reflected light, and were carried out X-ray analysis of XRD and SEM-EDS.

Results: In the quartz-chlorite slates occur fibroblastic structure with numerous microfolds. X-ray analysis of rocks indicates the presence of calcite, quartz and ferrous chlorites of magnesium-ferrous group. The ore has a steel-gray color, granoblastic structure, layered, compact texture, sometimes with microfolds and deformations. The ore has a lenticular layers of quartz. Background of the ore are doubly and triply twinned magnetite and hematite idioblasts in some cases.

Conclusions: The ore zone analysis indicates hydrothermal origin of the ore, which escaped to the earth surface by means of exhalations was deposited as sediment in clayey material. These deposits were metamorphosed in the chlorite facies.

Key words: Vrbno; Jesieniki; magnetite; ore; petrography.

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STRESZCZENIE

Wstęp: Przedmiotem niniejszej pracy jest efekt badań kilku kopanek w okolicy Mala Moravka-Karlova Studianka, w których znajduje się ruda magnetytowa, z chlorytami żelazistymi.

Materiały i metody: Próbki pobrano bezpośrednio ze złoża oraz z otoczenia rudy, następnie przeprowadzono obserwacje próbek w mikroskopie, w świetle przechodzącym i odbitym, oraz analizę rentgenowską XRD i SEM-EDS.

Wyniki: W łupkach kwarcowo–chlorytowych występuje struktura fibroblastyczna z licznymi mikrofałdami. Analiza rentgenograficzna skał wskazuje obecność kalcytu, kwarcu oraz chlorytów żelazistych z grupy magnezowo–żelazawej. Ruda charakteryzuje się stalowo–szarą barwą, strukturą granoblastyczną, teksturą zbitą, warstewkową, niekiedy z mikrofałdami. Ruda posiada soczewkowate warstwy kwarcu. Tło rudy stanowią podwójnie oraz potrójnie zbliźniaczone idioblasty magnetytu i niekiedy hematytu.

Wnioski: Analizy strefy rudnej wskazują na hydrotermalne pochodzenie rudy, która wydostawszy się na powierzchnię ziemi za pomocą ekshalacji została zdeponowana jako osad w materiale ilastym. Osady te zostały zmetamorfizowane w facji chlorytowej.

Słowa kluczowe: Vrbno; Jesieniki; magnetyt; ruda; petrografia.

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WPROWADZENIE

Omawiany teren znajduje się we wschodnich Sudetach [1, 2], w jednostce Masywu Desny, należącej do mikrokontynentu Bruno–Vistulicum (Fig. 1). W jednostce tej znajduje się płaszczowina Vrbna z seriami osadów dewońskich [3, 4]. Płaszczowina ta leży na wschód od kolizyjnej strefy Novego Mesta [5, 6], należącej do serii Hrabiszyńskiej [7].

Omawiane złoże znajduje się w utworach zmetamorfizowanych regionalnie w facji chlorytowej w warunkach umiarkowanego gradientu geotermalnego [4]. Wiek tych skał datowany jest na 340-325 mln lat. Są to sedymenty basenu Morawsko-Śląskiego wykształcone w postaci kwarcytów, łupków łyszczykowych i metawulkanitów [8]. Wśród tych skał występują złoża rudne strefy Mala Moravka i Vrbno, które są NE przedłużeniem strefy Medlov-Karlova-Benkov, zlokalizowanej przy przełomie górnomorawskim. Ciała te zaliczane są do typu Lahn Dill [9].

Przedmiotem niniejszej pracy jest efekt badań kilku kopanek w okolicy Mala Moravka – Karlova Studianka, w których znajduje się ruda magnetytowa, z żelazistymi chlorytami (Fig. 2). Ruda ta była eksploatowana na tych terenach już z początkiem XIV w. Kopanki te odsłaniają się w lesie nieopodal drogi w okolicy miejscowości Vrbno pomiędzy Moravką a Starą Studianką, przy moście na rzece Moravka. Odsłaniają się liczne hałdy w stoku niewielkiego wzgórza, widocznego po stronie zachodniej od w/w drogi. Idąc w lesie ku SW od mostku na rzece Moravka leśną drogą napotykane są doły po zapadniętych sztolniach i stare wyrobiska (Fig. 3). W niektórych stoi woda. Otoczeniem rud żelaza są łupki chlorytowo-kwarcowe, w których występują soczewki ułożonej warstwowo rudy magnetytowo-kwarcowej.

Fig. 1. Schematic structural-kinematic map of the Sudetes (on the basis of Z. Cymerman, 2000, simplified by the author). Schematyczna strukturalno–kinematyczna mapa Sude-tów (na podstawie Z. Cymerman, 2000, uproszczona przez autora).
Legends: BU – Bardo unit; ESD – Eastern Sudetes metamorphic units; IZC – Izera metamorphic complex; KAC – Kaczawa metamorphic complex; KMC – Kłodzko metamorphic complex; LSZ – Leszczyniec dextral shear zone; NSZ – Niemcza sinistral shear zone; OSD – Orlica Śnieżnik dome; RJ – Rudawy Janowickie metamorphic complex; ZSTZ – Złoty Stok – South Karkonosze metamorphic complex; SMC – Strzelin metamorphic complex; ZSTSZ – Złoty Stok – Trzebieszowice sinistral shear zone; ophiolites: B – Braszowice; NR – Nowa Ruda; S – Ślęża.

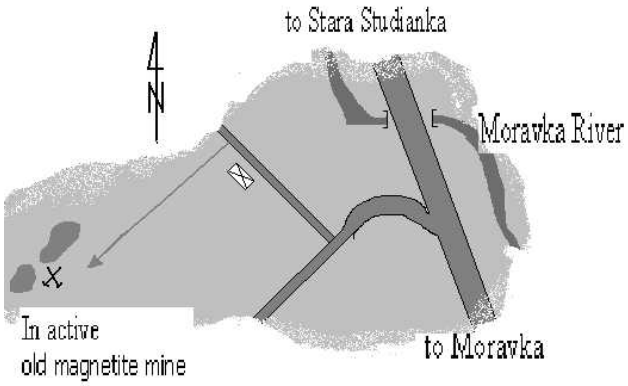

Fig. 2. Location of the old magnetite mines between the villages of Stara Studianka and Moravka (author Milosz Huber).
Lokalizacja starych kopanek magnetytu pomiędzy miejscowościami Stara Studianka i Moravka (autor Miłosz Huber).

MATERIAŁY I METODY

Autor zebrał próbki bezpośrednio ze złoża oraz z otoczenia rudy, przeprowadził obserwacje próbek w mikroskopie w świetle przechodzącym i odbitym, oraz dokonał analizę rentgenowską XRD, ICP-MS i SEM-EDS.

WYNIKI

Łupki chlorytowo–kwarcowe

W łupkach kwarcowo–chlorytowych występuje struktura fibroblastyczna z licznymi mikrofałdami (Fig. 4 a). Skały te mają bardzo dobrze widoczną teksturę liściastą, kierunkową, silnie zafałdowaną. Mikrofałdy często ulęgają fleksuralnemu zwężeniu w strefach skrzydłowych i pogrubieniu w strefach siodłowych (fig. 4b). Zbudowane są one głównie z chlorytu (71%), kwarcu (13%), materii organicznej (7%), kalcytu (5), hematytu (4%). Tło skały stanowią zdeformowane blasty chlorytu, tworzące laminy wraz z kwarcem (fig 4c, d). W interstycjach chlorytów znajduje się rozproszona materia organiczna oraz hematyt.

W skale widoczne są też drobne laminy zbudowane kalcytu. Występuje tu szereg mikrouskoków, przypominających struktury palmowe, wytyczających powierzchnie S (podkreśloną przez hematyt i kwarc) oraz nowe powierzchnie S podkreślone przez nowe żyły mineralne (głównie kwarcowe). Występujące w skałach lineacje elongacyjne są mocno zaburzone i trudne do jednoznacznej interpretacji, szczególnie w wyniku dużych deformacji chlorytu powstałej na skutek oddziaływania naprężeń zginających i ścinających.

W skale widoczne są także rozwalcowane wrzecionoblasty kwarcu. Struktury te świadczą o dynamice procesów formowania się i metamorfizmu tych skał. Analiza rentgenograficzna skał wskazuje na obecność kalcytu, kwarcu oraz żelazistych chlorytów z grupy magnezowo–żelazawej (Fig. 5).

Fig. 3. Photographs of mining operations remains.
Fotografie pozostałości po pracach górniczych.

Ruda magnetytowo–kwarcowo–kalcytowa

Ruda charakteryzuje się stalowo–szarą barwą, strukturą granoblastyczną, teksturą zbitą, warstewkową, niekiedy z mikrofałdami. Ruda posiada soczewkowate warstwy kwarcu. Widoczne są żyły kwarcowe, licznie tnące strefę rudną (Fig. 6 a, b). Tło rudy stanowią podwójnie i potrójnie zbliźniaczone idioblasty magnetytu (46%, co potwierdzają też badania EDS) i niekiedy hematytu (3%), tworzących różnej grubości (od kilku części mm do cm) warstewki (Fig. 6 c, d). W interstycjach magnetytu

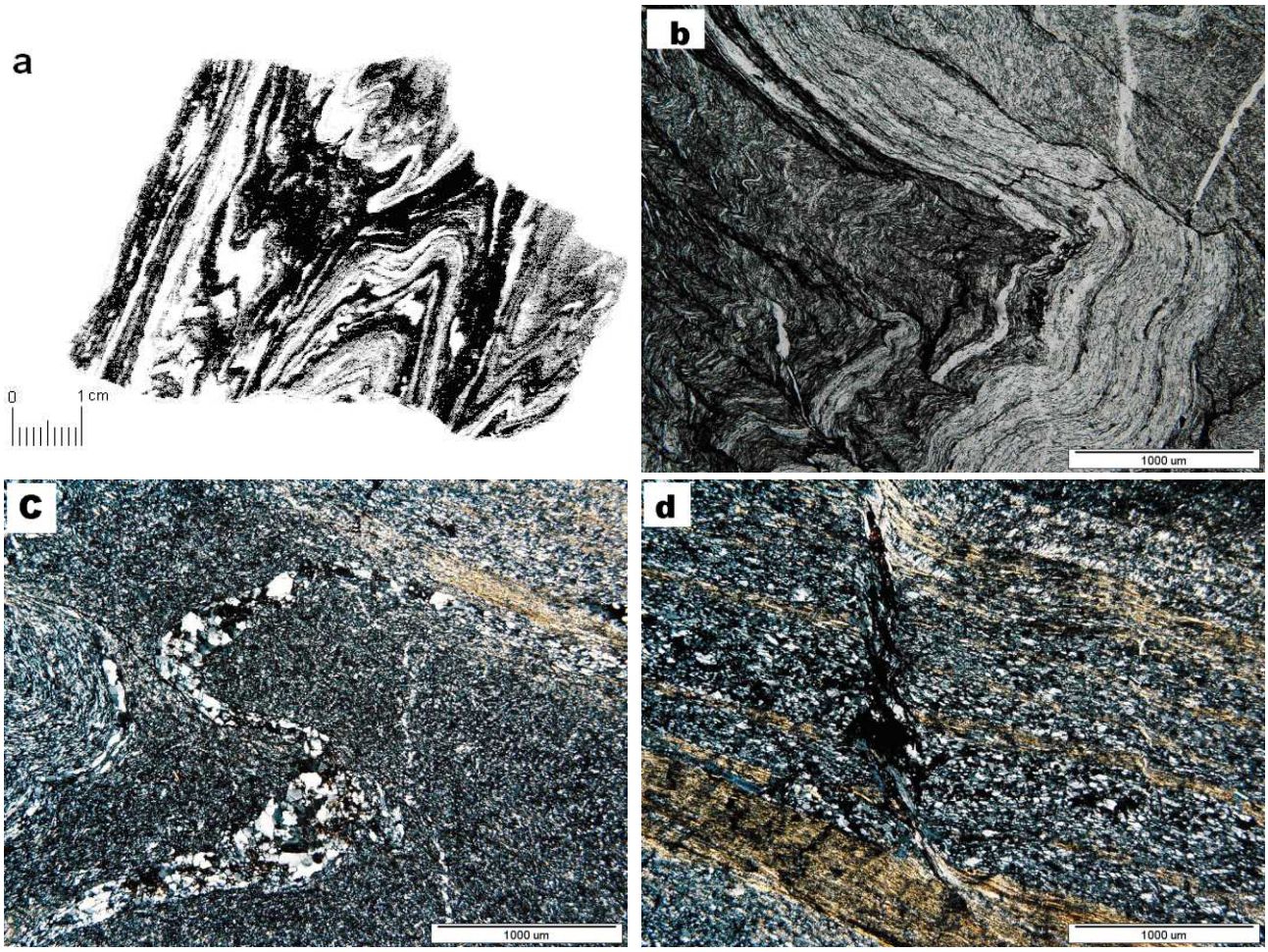

Fig. 4. Macro- (a) and microphotographs (transmitted light at one nicol: b, and with crossed pollars: c, d) of chlorite-quartz shist.
Makro- (a) i mikrofotografie (w świetle przechodzącym przy jednym nikolu: b, i przy nikolach skrzyżowanych: c, d) łupku chlorytowo–kwarcowego.

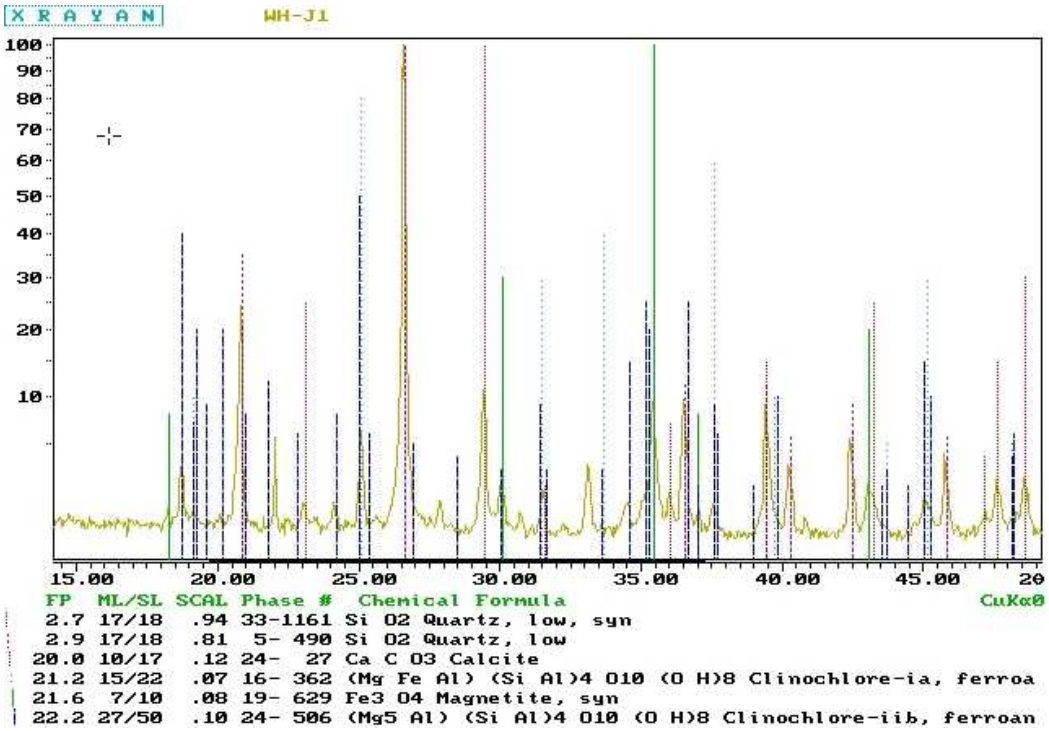

Fig. 5. Results of powder XRD analysis of chlorite-quartz shist.
Wyniki proszkowej analizy XRD łupku chlorytowo–kwarcowego.

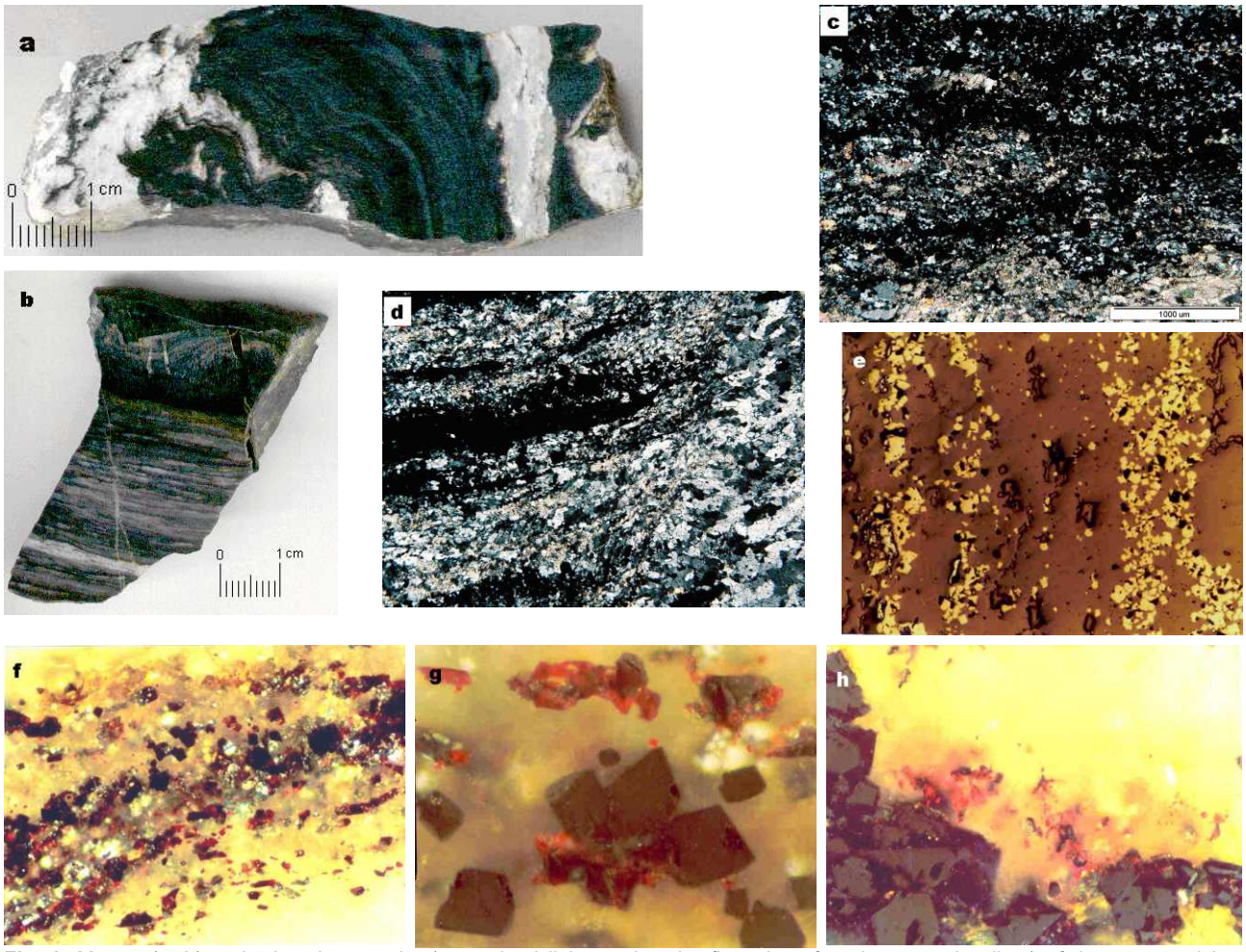

Fig. 6. Macro- (a, b) and microphotographs (transmitted light: c, d and reflected: e, f, g, h, crossed pollars) of the quartz-calcite-magnetite ore.

Makro- (a, b) i mikrofotografie (w świetle przechodzącym: c, d i odbitym: e, f, g, h, nikole skrzyżowane) rudy kwarcowo–kalcytowo–magnetytowej.

Table 1. The chemical composition of samples of magnetite ore.

Skład chemiczny próbki rudy magnetytowej.

Probe Próba	As	Mo	Cr	W	Zn	Cd	Co	Ni	Fe	Mn	V	Cu	Ti	Au
[ppm]	56,37	505,79	15,82	0,71	51,02	45,68	6,91	113,64	326617,6	362,97	66,10	4,88	245,54	1,25

widoczne są kryształy kwarcu (31%) i kalcytu (15%), tworzące osobne laminy. W sąsiedztwie magnetytu spotyka się też chloryty (5%).

Naprzemianległe warstewki magnetytu z kwarcem, chlorytami i kalcytem ukazują osadowy charakter rudy. Struktura magnetytu wskazuje na procesy rekrystalizacji (regeneracji) w warunkach metamorfizmu facji chlorytowo–epidotowej. Magnetyt wykazuje ponadto wtórne procesy martytyzacji, o czym świadczą hematytowe pseudomorfozy. Hematyt występuje w skale w postaci samodzielnych ziaren, jak również i wewnątrz blastów magnetytu (Fig. 6 g, h).

Analiza chemiczna próbki (Tab. 1) wskazuje na domieszki Mo, Ti, Ni, które świadczą o magmowym – zasadowym środowisku pochodzenia rudy. Stosunkowo dużą ilość Mn w próbce wskazuje sedymentacyjny charakter osadu, który mógł wydostać się na powierzchnię jako produkt ekshalacji hydrotermalnej w warunkach podmorskich [9-12].

WNIOSKI

Analizy strefy rudnej wskazują na hydrotermalne pochodzenie rudy, która wydostawszy się na powierzchnię ziemi za pomocą ekshalacji została zdeponowana jako osad w materiale ilastym. Osady te zostały zmeta-

morfizowane w facji chlorytowej. Podczas metamorfizmu tych skał doszło do powstania mikrofałdów i mikrouskoków. Wskazuje to na dużą dynamikę środowiska, która prawdopodobnie towarzyszyła aktywności pobliskich nasunięć. Żyły kwarcowe tną uformowane struktury metamorficzne związane są z intensywną tektoniką, która spowodowała budinaż niektórych warstw (dobrze to ilustruje Fig. 6a). Są one związane z procesami metamorficznymi obejmującymi omawianą serię skał.

Procesy wietrzenia objawiające się występowaniem hematytu i martytu ograniczają się zwykle do stref propagacji roztworów towarzyszących uskokom w skałach. Obecny stan kopanek jak i ilość występującej w nich rudy nie przedstawia sobą nagromadzenia o charakterze gospodarczym. Warstwowy charakter rudy może stanowić przesłanki do poszukiwań kontynuacji rudy, jednakże niewielka jej miąższość nie budzi oczekiwań na większe nagromadzenia magnetytu w tym rejonie.

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