Rudarsko-geološko-naftni zbornik	Vol. 5	str. 15–20	Zagreb, 1993.

UDC 553.492:622.2(091)(497.13-15) *Izvorni znanstveni članak*

FOUR CENTURIES OF BAUXITE MINING

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Key-words: Bauxite, Istria, Saxon miners, Turini, »Miniera/Minjera«, Berthier

In the paper the results of many years of archival and field investigations in the history of bauxite mining of the three authors are presented. It was established that in Istria in the valley of the river Mirna beneath the Castle of Sovinjak bauxite was exploited already 400 years ago, and that 1808 about this ore the first scientific account was published. Accordingly, the statements in the professional literature that the first bauxite mine opened 1873 in the French Provence and that the bauxite ore for the first time was scientifically described 1821 have to be revised.

About this necessary revision here the essential proofs are produced.

Ključne riječi: Boksit, Istra, Saski rudari, Turini, »Minjera«, Berthier

U radu se iznose rezultati višegodišnjeg arhivskog i terenskog istraživanja historije boksitnog rudarstva trojice autora. Utvrđeno je da se u Istri u dolini rijeke Mirne pod Sovinjakom boksit otkopavao još prije 400 godina te da je o toj rudi 1808 objavljen prvi naučni prikaz. Prema tome, treba revidirati podatke u stručnoj literaturi o tome da je prvi rudnik boksita otvoren 1873 u francuskoj Provansi i da je ruda boksit prvi put naučno opisana 1821.

O toj potrebnoj reviziji prioriteta izneseni su ovdje neophodni dokazi.

Till now in the history of bauxite mining it was accepted that the first scientific description of bauxite was published in the year **1821** and the first mine opened **1873**. Neither of the two statements is correct: the **first description of bauxite was published in 1808** and the **first bauxite mine opened before 1566.**

It's not clear how the incorrect data 1821/1873 could have been accepted as indubitable, and even less clear is how they could have been maintained as such up to this day, and even in our Croatian historiography.

Such a situation is astonishing out of two reasons: first, in Istria in a certain region there from times immemorial are known imposing remnants of some old mining workings, totally different from recent exploitation methods, and, second, in the (accessible) relevant literature it is clearly stated that »already in the past centuries in the valley of the river Quieto/Mirna bauxite has been exploited« (D'Ambrosi, 1955). Exploited was pyritic bauxite, a raw material for the winning of vitriol and alum, very important commodities from very old times.

The mentioned old workings are situated in the upper part of the Mirna valley beneath the Castle of Sovinjak, a little upstream from the known sulphur spa Sv. Stjepan (St. Stephen) in northern Istria. The center of the »mining region« is the locality »Minjera« (from Italian »miniera« – mine) which in that Croatian version is registered on all contemporary maps of the adequate scale. The »region« in proper sense is shown in Fig. 1, and in Fig. 2 the results of three years of authors' investigations are represented, with the geological interpretation of one of them (K. S.).

So far, 17 mining sites have been found (all of them are marked in Fig. 2), but it can be supposed that there are yet more. All are underground workings; that is a big difference – in fact, a big surprise – compared with the other common Istrian mines which almost all are surface workings.

The mines are opened by adits of a standard profile shown in Fig. 3. Some of them were up to 30 m long. They have been driven by hand, with hammer and gad, using black powder for blasting, i. e. applicating then modern methods. Most of the adits are still passable.

According to estimates of the authors', all in all in the region of the »Minjera« some 150000 t of bauxite has been won, what means that the deposits on the average could have held up to 10000 t of ore; the biggest, D-5 and D-14, may have had even 22000 t.

In Fig. 4, 5, and 6 characteristic profiles and a photo of these »mysterious« old workings are presented. »Mysterious« insofar as in the professional literature besides vague hints there can no information whatsoever of them be found. However, of mining workings from old times there are reports of an other kind.

Thus, the bishop Tommasini of Novigrad/Cittanova in his »Commentarii dell'Istria« from 1646 states how »about eighty years ago the German miners hurriedly abandoned their alum mine near Sovignacco/Sovinjak«. 1646 – 80 = 1566.

In this short communication not all details of the authors' long investigations can be told. They are made public in three other papers (1992, 1993 /2x/); one of them was also presented on the international bauxite experts congress last summer in Hungary

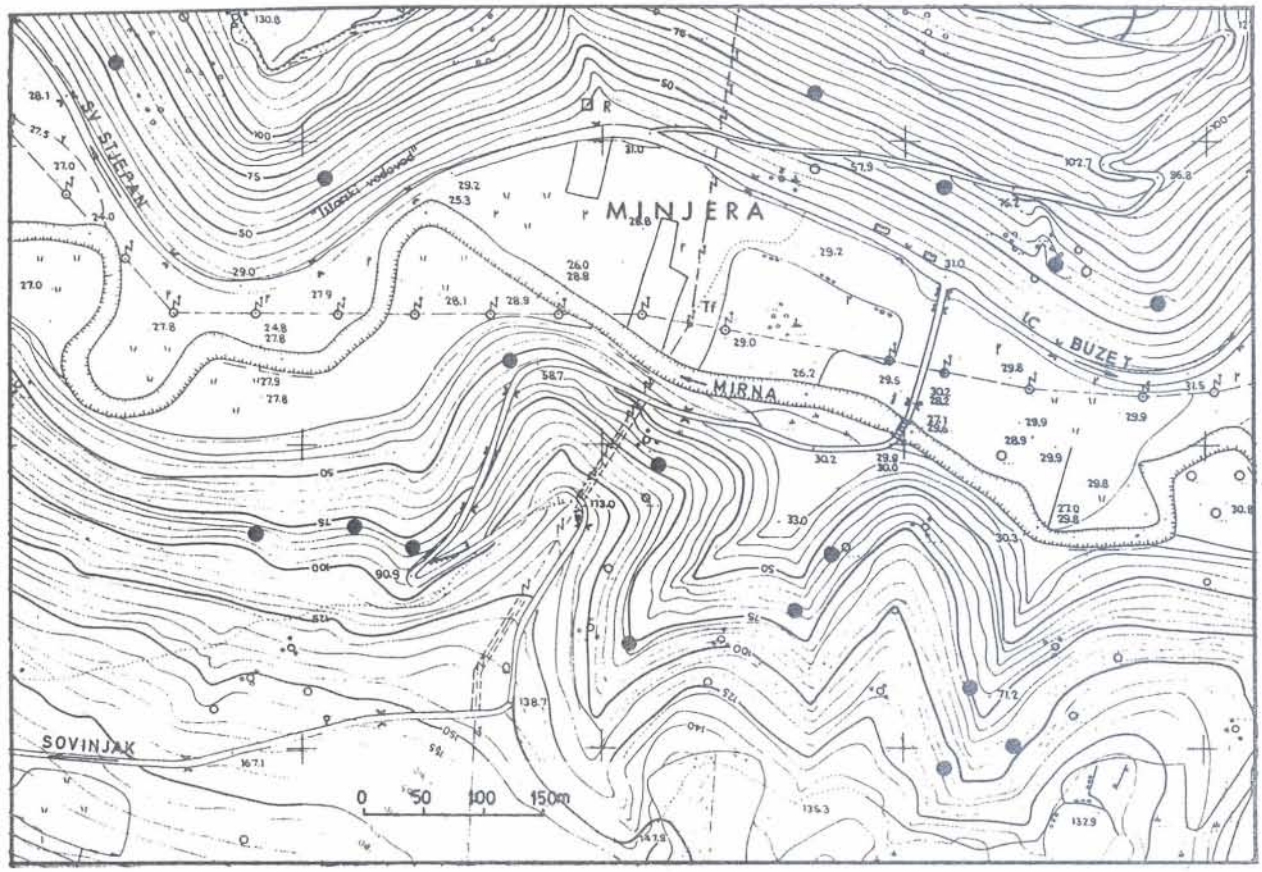

Fig. 1. Sector of the geodetic map 1:5000 (1975). ● Position of the exploited deposits

Sl. 1. Isječak iz geodetske karte 1:5000 (1975). ● Položaj otkopanih ležišta

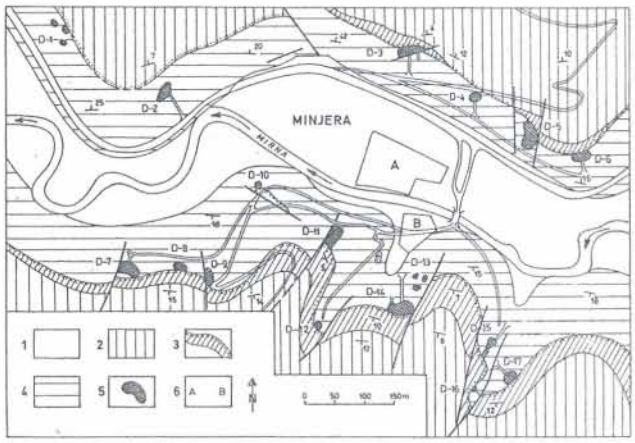

Fig. 2. The »Minjera« with the immediate working areal. **1** Alluvion, **2** Foraminifera limestones; Upper Paleocen – Lower Eocen, **3** Kozina layers; Middle Paleocen, **4** Well-bedded limestones; Cenoman – Turon, **5** Exploited pyritic bauxite deposits, **6**: **A** Site of the beneficiation plant, **B** Site of the alum and vitriol factory

*Sl. 2. »Minjera s užim eksploatacijskim područjem. **1** aluvij, **2** foraminiferski vapnenci; gornji paleocen – donji eocen, **3** Kozina-naslage; srednji paleocen; **4** dobrouslojeni vapnenci; cenoman – turon, **5** otkopana ležišta piritnog boksita, **6**: **A** prostor oplemenjivačkog pogona, **B** prostor tvornice stipse i sumporne kiseline*

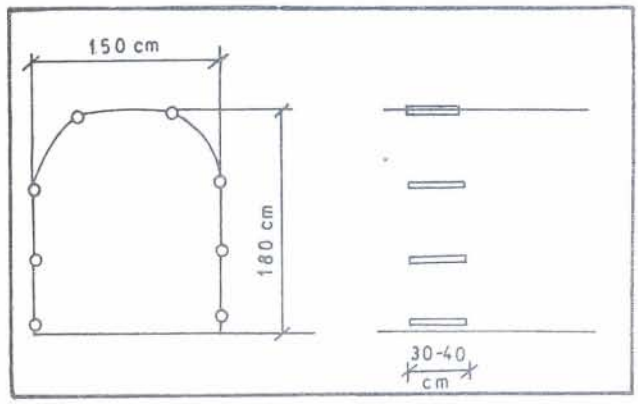

Fig. 3. Cross-section of a standard adit

Sl. 3. Profil standardnog potkopa

(7th ICSOBA-Congress). Here we shall restrict ourselves to a short summary of our investigations till now.

The »German miners« are Saxons, founders and architects of the famous Balkans mining during the 13., 14., and part of the 15. century, then the foremost European mining. The Saxons worked in Novo Brdo/Nyeuberge, Trepča, Kratovo, Srebrnica, in all important Balkan mines, westwards up to Idria. After the Turkish occupation of the Balkan Peninsula, that brilliant mining was extinct, and all aliens, and consequently the Saxons, too, left the invaded countries. As Jireček in his »History of the Serbs« states, in the year 1600 no more Saxons were in the Balkans, but long ago emigrated to

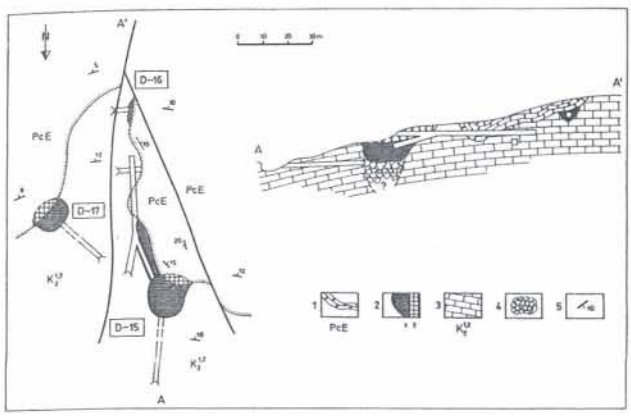

Fig. 4. Cross-section of deposits D-15, D-16 and D-17. **1** Kozina layers, **2** Bauxite: (1) exploited, (2) under the roof, **3** Rudist limestones; Upper Cretaceous, **4** Collapse structure, **5** Dip and strike

Sl. 4. Profil ležišta D-15, D-16 i D-17. **1** *Kozina-naslage,* **2** *boksit: (1) otkopano, (2) pod krovinom,* **3** *gornjokredni rudistni vapnenci,* **4** *zarušak,* **5** *pružanje i nagib*

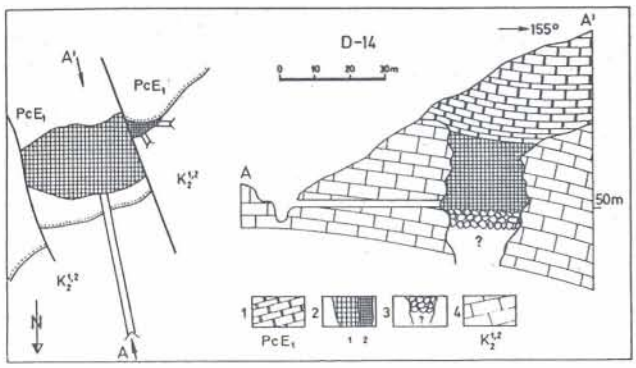

Fig. 5. Cross-section of the deposit D-14. **1** Kozina layers and foraminifera limestones, **2** Bauxite: (1) under the roof, (2) outcrop, **3** Collapsed structure, **4** Limestones with rudists

Sl. 5. Profil ležišta D-14. **1** *Kozina-naslage i foraminiferski vapnenci,* **2** *boksit: (1) otkopano, (2) izdanak,* **3** *zarušak,* **4** *gornjokredni rudistni vapnenci*

»Dalmatian cities and to Italy« (1952, p. 270). At that time, end of the 16. century, and looking from the Balkans, »Italy« is by all means Venice – and the »Tower of Buzet/Pinguente« (then the official denomination of the region) was Venetian. Moreover, in the neighbouring Austrian Carniola, at Idria, Saxons were already working, so it's only naturally that they, too, influenced their countrymen to come to Istria. After all, K a n d l e r (1875) concisely states that »all miners of the Serenissima always have been Germans«.

There is yet an other heavy reason for the statement about the Saxons as the Mirna valley miners. Almost all deposits there have been covered by Eocenic layers, no outcrops have been visible; therefore, a profound knowledge and long experience for their discovery was needed. For that reason, D ' A m b r o s i still 1955 laments that his contemporaries avoid to prospect such deposits whilst their predecessors centuries ago exploited them, and adds: ». . . I don't know how they already at that time managed to discover these deposits, so well hidden

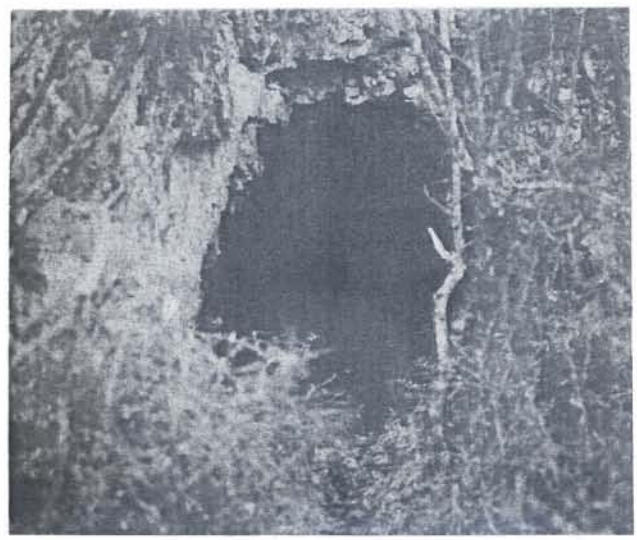

Fig. 6. Present state of the adit D-3

Sl. 6. Sadašnji izgled potkopa D-3

by Nature itself«. Such experienced miners at that time could have been only Saxons.

Why the Saxons abandoned their mines, and »hurriedly« (!), we couldn't made out till now. However, the break was not longlasting: still during Tommasini's episcopacy a Venetian merchant, Cavanis, reactivated the mines. After Cavanis' death, a second break occurred, which lasted, it seems, till the end of the 18. century, when, 1781, the ex-lieutenant of the Venetian Engineering Corps Pietro T u r i n i here »discovered«, as he says, an ore »pirite«. Five years later, 1786, he opens the »Miniera di allume e vetriolo«, i. e. a mine of alum and vitriol – an enterprise famous in historical, economical, technical, and scientific sense. Maybe that Turini has had a too vivid imagination but he without doubt was an excellent manager and a gifted, although probably untrained, technologist. His »Miniera/Minjera« before long became an important industrial center, of an almost fateful significance for the surroundings and even whole Istria. After A g a p i t o (1823), more than 500 households depended directly upon the »Minjera«. That would be a considerable number even now, and the more so at the beginning of the last century, when the Buzet Tower region has had a few thousand inhabitants; so perhaps half of the population lived on the »Minjera«. Thus, it is not in the least surprising that the »Minjera« and all things in connection with it remained in vivid remembrance of the citizens there.

Palpable traces of the »Minjera« are left too. In a dense underbrush on the left bank of the Mirna, by the bridge with the road to the near village of Sovinjak, there are some thick ivyclad ruinous walls of the former alaun factory. And immediately on the opposite bank the hedged space can be seen where the ore in well dimensioned piles has been beneficiated, in the first phase by water sprinkling under porches during several months; of course, there are no more traces of the porches but quite a number of waste piles of the lyed ore.

However, after all, the »Minjera's« greatest significance lies in its scientific importance. **1808** Turini published in Venice an extensive treatise »Della preparazione dell'allume nella miniera di S. Pietro nel dipartimento dell'Istria«. The book has 67 pages in 8vo and is indeed the first scientific description of bauxite in the world. As already said, Turini calls the ore »pirite« and uses it for winning of vitriol and alum in that his Mine St. Peter. He very comprehensible describes the ore from physical as well chemical point of view, giving also an analysis result in weight percents. Especially detailed is the technology of the ore beneficiation process. That's an interesting account, with critical remarks and expertly founded descriptions of some technological innovations too, which are real improvements of an essentially very old process.

Turini's book is published 13 years before Berthier's famous essay on the »hydratized alumina«. The French chemist Piere Berthier published **1821*** in the Parisian Annales des Mines a short paper about the chemical analysis of a sample sent him from the locality Les Beaux in the Provence as an iron ore, to decide if it could be used for iron winning in blast furnaces. Berthier correctly judged that the stuff is not suitable for that because of its low iron content and consequently high smelting costs. Berthier's essay up to now was valued as the first scientific description of the ore today known as bauxite. This attribution the essay obviously holds unjustly.

1873 opened a mine at **Villeveyrac** in the French Provence as the first mine of bauxite, the ore of aluminium. Thus, Les Beaux lent its name to the new ore, very likely because then in an obviously more influential part of the scientific world Les Beaux was adopted as the world's first occurrence of that new ore. The denomination »bauxite« instead of the (then) correct »beauxite« was accepted about the year 1861, on the suggestion of Saint-Claire Deville, a French medico and chemist, who, somewhere about 1854, first succeeded, by chemical reduction of silica, to win metallic aluminium; next year that aluminium at the Paris »Exposition Universelle« aroused a very sensation as »silver from lime« in the form of span-long bars in a glass-box.

The expression »an obviously more influential part of the scientific world« is justified insofar as 1847, i. e. before Deville's suggestion, the known Freiberg mineralogist Breithaupt in his big mineralogical handbook for the same ore, found at the locality Kljaci near Drniš in Dalmatia, proposed the name »cliachit«, Similarly, i. e. unaccepted, passed the denomination »wocheinit«, which the Austrian mineralogist Lill proposed for the same ore but from Bohinj/Wochein in Slovenia, but, it's true, after Deville.

* * *

Priorities in science are very important, not out of prestige and commercial reasons alone. Science is and must remain the refuge and protector of Verity. Therefore the following statements must be acknowledged:

1. The first bauxite mines in the world opened in the first half of the 16. century in Istria in the valley of the river Mirna beneath the Castle of Sovinjak, and
2. The first scientific description of the bauxite ore was written by Pietro Turini in the year 1808.

Final Annotation: With regard to the world significance of the locality »Minjera«, the Croatian Natural History Museum, Zagreb, the Faculty of Mining, Geology, and Petroleum Engineering of the Zagreb University, and the Municipality of Buzet (on whose areal the »Minjera« is situated) initiated the statutory protection of the region in proper limits, e. g. as a Memorial of Nature. It is thought that the whole complex may serve to touristic and educational purposes. The initiative is in principle accepted.

Received: 3. V. 1993.

Accepted: 27. V. 1993.

* Rarely it is mentioned (it's not known, why) that Berthier a year ago (1820), also in the Annales des Mines (vol. V, p. 129), published an analysis of a »ferrous material« from the Westafrican region Futa Djallon (there are other spellings too), then in the French colony Senegal, now in the Repbulic of Guinea. Berthier hasn't assumed that the samples from Les Beaux and Futa Djallon in fact have been representants of the same raw material, i. e. bauxite and laterite, respectivelly. That was revealed but eighty years later by the German chemists Bauer and Warth. About all that wrote Fox (1932, p. 1) as well as Bracewell (1962, p. 168), but it's unexplainable that Fox writes how Berthier in that material found 8,7% Al_2O_3 but Bracewell 40%. – At any rate, the year 1820, too, is late 12 years after Turini.

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Četiri stoljeća rudarstva boksita

R. Marušić, K. Sakač i S. Vujec

Dosada se u historiji rudarstva boksita uzimalo da prvi znanstveni opis te rude potiče iz godine **1821** a da je prvi rudnik boksita otvoren **1873**. Ni jedno ni drugo nije točno: prvi opis boksita potiče iz godine **1808** a prvi je rudnik boksita otvoren prije godine **1566.**

Nije jasno ni kako su netočni podaci 1821/1873 prihvaćeni kao neosporni, a još je manje jasno kako su se mogli održati kao takvi sve do danas, pa i u našoj rudarsko-geološkoj historiografiji.

Takvoj se situaciji valja čuditi iz dva razloga: prvo, u Istri se na određenom području od davnina nalaze impozantni ostaci nekih starih rudarskih radova, potpuno različiti od recentnih eksploatacijskih radilišta, i, drugo, u (dostupnoj) relevantnoj literaturi jasno piše da se »već u prošlim stoljećima u dolini Mirne otkopavao boksit« (D'Ambrosi, 1955). Otkopavao se piritni boksit, sirovina za dobivanje sumporne kiseline i alauna/stipse, veoma značajne robe od pradavnih vremena.

Spomenuti se stari rudarski radovi nalaze u gornjem toku rijeke Mirne ispod mjesta (»kaštela«) Sovinjaka, nešto malo uzvodno od poznatih sumpornih toplica Sv. Stjepan u sjevernoj Istri. Centar je »rudarske regije« lokalitet »Minjera« (od tal. »miniera« – rudnik) koji je u toj pohrvaćenoj verziji označen i na svim današnjim kartama odgovarajućeg mjerila. Uža je »regija« prikazana na sl. 1, a na sl. 2 prikazani su rezultati trogodišnjih istraživanja autorâ, s geološkom interpretacijom jednoga od njih (K. S.).

Dosada je nađeno 17 radilišta-rudnika (svi su označeni na sl. 2), ali se može pretpostaviti da ih ima još. Sve su to jamski radovi, što je velika razlika – i, ustvari, veliko iznenađenje – u usporedbi s drugim, uobičajenim istarskim boksitnim radilištima koja su gotovo sva površinski kopovi.

Stare su jame otvarane potkopima standardnog profila prikazanog na sl. 3. Dužina takvih potkopa dostizala je i 30 m. Tjerani su ručno, klinom i čekićem, uz miniranje crnim barutom, tj. primjenom tada suvremenih metoda. Većina je potkopa i danas prohodno.

Po proračunima autorâ, ukupno je na području »Minjere« moglo biti otkopano oko 150000 t boksita, što znači da su ležišta u prosjeku sadržavala do 10000 t; najveća, D-5 i D-14, mogla su imati i do 22000 t (v. sl. 2).

Na sl. 4–6 dati su neki karakteristični presjeci i prikazi nekih od tih »misterioznih« starih rudnika. »Misterioznih« utoliko što o njima u stručnoj literaturi osim neodređenih aluzija nema ni spomena. Međutim, o rudarskim radovima »iz prošlih stoljeća« ima i drugih vijesti.

Tako, novigradski biskup Tommasini u svojim »Commentarii dell'Istria« iz godine 1646 navodi kako su »prije osamdesetak godina njemački rudari naglo napustili svoj rudnik stipse kod Sovinjaka«. 1646 – 80 = 1566 g.

U ovom kratkom priopćenju ne mogu se iznijeti svi detalji dugotrajnih ispitivanja što su ih obavili autori. Oni su iznijeti u tri druga rada, od kojih je jedan prikazan i na internacionalnom boksitaškom kongresu (7th International Congress of ICSOBA) prošlog ljeta u Madžarskoj. Ovdje ćemo se ograničiti na rezime naših dosadašnjih istraživanja.

Radi se o rudarima Sasima, utemeljiteljima i graditeljima znamenitog rudarstva Balkanskog poluotoka 13., 14. i dijela 15. stoljeća, tada najznatnijeg evropskog rudarstva. Sasi su radili u Novom Brdu, Trepći, Kratovu, Srebrnici, svim značajnim balkanskim rudnicima, sve do Idrije. Najezdom Turaka na Balkan to se sjajno rudarstvo gasi i svi stranci, pa naravno i Sasi, napuštaju zauzete zemlje. Kako Jireček u svojoj »Historiji Srba« (1952, p. 270) navodi, godine 1600 Sasa više nije bilo na Balkanu, već su davno bili emigrirali »u dalmatinske gradove i Italiju«. U to doba, potkraj 16. stoljeća i gledano s Balkana, »Italija« je gotovo sigurno Venecija, a »Buzetska kula« (tadašnji zvanični naziv), s gornjim tokom Mirne, tada je mletačko područje. Usto, u susjednoj austrijskoj Kranjskoj, u Idriji, već otprije rade Sasi, pa je prirodno da su i oni utjecali na dolazak svojih zemljaka. A Kandler (1875, p. 15), uostalom, kratko i jasno kaže da su svi rudari Serenissime uvijek i bili Nijemci.

Ima još jedan krupan razlog za tvrdnju da se radi baš o rudarima Sasima. Gotovo su sva ležišta u dolini Mirne bila pokrivena eocenskim naslagama, nije bilo vidljivih izdanaka, pa je trebalo velikog znanja i iskustva za njihovo otkrivanje. Zato se još 1955. D'Ambrosi žali da njegovi suvremenici izbjegavaju istraživanje takvih ležišta, dok su ih njihovi prethodnici stoljećima ranije eksploatirali, pa dodaje: »...Ne znam kako su oni već u to vrijeme uspijevali da pronađu ta ležišta, tako dobro skrivena od Prirode same«.

Zašto su Sasi napustili svoje rudnike, i još »naglo«, zasada nismo mogli utvrditi. Međutim, prekid nije dugo trajao, jer je još za vrijeme Tommasinija mletački trgovac Cavanis reaktivirao rudnike. Nakon njegove smrti došlo je do drugog prekida koji je, čini se, trajao do potkraj 18. stoljeća kada je, 1781, mletački pionirski eks-poručnik Pietro Turini tu »otkrio«, tako on kaže, rudu »pirite«. Pet godina kasnije, 1786, Turini otvara »Miniera di allume e vetriolo«, dakle Rudnik alauna/stipse i vitriola/sumporne kiseline – poduzeće znamenito u povijesnom, privrednom, tehničkom i znanstvenom pogledu. Turini je možda imao suviše živu maštu, ali je nesumnjivo bio odličan menedžer i nadaren, iako valjda priučen, tehnolog. Njegova je »Miniera/Minjera« uskoro postala važno industrijsko središte, s gotovo sudbonosnim značenjem ne samo za bližu okolinu već i za cijelu Istru, pa i Mletačku Republiku. Po Agapitu (1823), više je od 500 obitelji živjelo direktno od »Minjere«. To bi i danas bio značajan broj, a pogotovo na početku prošlog stoljeća, kada je Buzetska kula imala možda nekoliko hiljada stanovnika, pa je tako valjda pola stanovništva živjelo od »Minjere«. Zato nije čudno što je »Minjera« i sve u vezi s njom do danas ostala u živom sjećanju mještana. A ostalo je i opipljivih tragova. U gustoj šikari na lijevoj obali Mirne, blizu mosta preko kog prelazi cesta za nedaleki Sovinjak, ima nekoliko debelih bršljanom obraslih ruševnih zidova nekadašnje tvornice alauna. A odmah na suprotnoj obali jasno se vidi živicom ograđen prostor gdje se ruda u strogo-dimenzioniranim hrpama oplemenjivala, u prvoj fazi višemjesečnim zalijevanjem pod nadstrešnicama; od nadstrešnica naravno više nema traga, ali ima još dosta »jalovinskih« ostataka izlužene rude u hrpama.

Međutim, ipak »Minjera« najveće značenje ima u znanstvenom pogledu. **1808** objavio je Turini u Veneciji opširnu raspravu »Della preparazione dell'allume nella miniera di S. Pietro nel dipartimento dell'Istria«. Knjiga ima 67 stranica u oktav-formatu i zaista je prvi naučni prikaz boksita u svijetu. Turini rudu naziva »pirite«, kao što je već rečeno, i koristi je kao sirovinu za dobivanje vitriola (sumporne kiseline) i alauna (stipse) u tom svom »rudniku« (zapravo, rudarsko-metalurškom kombinatu) Sv. Petra. Tu svoju sirovinu vrlo iscrpno opisuje, i u fizikalnom i kemijskom pogledu, dajući i kemijsku analizu u težinskim procentima. Osobito je detaljno dat tehnološki proces oplemenjivanja rude. To je zanimljiv prikaz, s kritičkim opaskama i znalačkim opisima i nekih tehničko-tehnoloških inovacija koje su zaista i stvarna poboljšanja u biti veoma starog procesa.

Turinijeva je knjiga objavljena 13 godina prije znamenite Berthierove rasprave o »hidratiziranoj glinici«. Francuski kemičar Pierre Berthier objavio je **1821*** u pariškim Annales des Mines kratak članak o kemijskoj analizi uzorka neke sirovine što mu je poslat s lokaliteta Les Beaux u Provansi kao ruda željeza, s molbom da provjeri može li se taj materijal koristiti za dobivanje gvožđa u visokim pećima. Berthier je ispravno prosudio da sirovina za to ne dolazi u obzir zbog nedovoljnog sadržaja željeza i stoga previsokih troškova taljenja.

Berthierov je članak sve dosada važio kao prvi znanstveni opis rude koju danas nazivamo boksit. Taj atribut članak očevidno nosi neopravdano.

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* Rijetko se spominje podatak (ne zna se zašto) da je Berthier godinu dana prije (1820), također u Annales des Mines (god. V, p. 129), objavio analizu »željezovitog materijala« iz zapadnoafričkog područja Futa Djallon (ima i drukčijih ortografskih varijanti), tada u francuskoj koloniji Senegal a danas u Republici Gvineji. Berthier nije uočio da se kod uzoraka iz Les Beauxa odn. Futa Djallona ustvari radi o istoj sirovini, boksitu odn. lateritu. To su tek osamdesetak godina kasnije utvrdili njemački kemičari Bauer i Warth. O svemu tome pišu naprimjer Fox (1932, p. 1) i Bracewell (1962, p. 168) – pri čemu je neobjašnjivo da Fox veli kako je Berthier u toj sirovini našao 8,7% Al_2O_3, a Bracewell 40%. – U svakom slučaju, i godina 1820 kasni za Turinijem 12 godina.

1873 proradio je rudnik u **Villeveyracu** u Provansi kao prvi rudnik boksita, rude aluminija. Les Beaux je dakle dao ime novoj rudi, vjerojatno zato što se tada u jednom, očevidno utjecajnijem, dijelu naučnog svijeta držalo da je Les Beaux prvo svjetsko nalazište te nove rude. Ime »bauxite« prihvaćeno je otprilike 1861, na prijedlog Saint-Claire Devillea, francuskog medicinara i kemičara, koji je, negdje 1854, prvi uspio, kemijskim postupkom redukcije silicijskog dioksida, dobiti metalični aluminij koji je naredne godine na svjetskoj izložbi u Parizu izazvao senzaciju kao »srebro iz gline« u obliku pedalj dugih šipkica u staklenoj vitrini.

A sintagma »očevidno utjecajniji dio naučnog svijeta« opravdana je utoliko što je 1847, dakle prije Saint-Claire Devillea, znameniti frajberški mineralog Breithaupt u svom velikom mineraloškom priručniku za istu rudu, nađenu u Kljacima kod Drniša, predložio naziv »cliachit«, kljakit. Slično, tj. neprihvaćeno, prošao je i naziv »wocheinit«, vohajnit, što ga je predložio austrijski mineralog Lill prema rudi iz Bohinja, ali 1865, dakle poslije Devillea.

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Prioriteti u nauci veoma su važni, ne samo iz prestižnih i komercijalnih razloga. Nauka jest i treba da ostane utočište i zaštitnica Istine. Stoga valja konstatirati da su:

1. prvi rudnici boksita u svijetu otvoreni u prvoj polovini 16. stoljeća u Istri u dolini Mirne pod Sovinjakom, i
2. prvi je znanstveni opis rude boksita dao 1808 Pietro Turini.

Završna napomena: S obzirom na svjetsko značenje lokaliteta »Minjere«, Hrvatski prirodoslovni muzej, Rudarsko-geološko-naftni-fakultet i Općina Buzet (na čijem se području »Minjera« nalazi) pokrenuli su inicijativu da se uže područje uredi i stavi pod zakonsku zaštitu, npr. kao spomenik prirode. Predviđeno je da posluži u turističke i edukativne svrhe. Inicijativa je u načelu prihvaćena.