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Kolapsne strukture u boksitnim jamama Istre

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Krovinu boksitnih ležišta u jamama postkrednog paleoreljefa, izgrađuju paleocen-donjoeocenski laminirani biomikriti kanalskog tipa sedimentacije. Naslage su deformirane u stisnute sinklinale koje imaju dvije vrste orijentacije B-osi s blagim tonjenjem prema sjeveroistoku ili jugoistoku.

Različite orijentacije osi, potpuno osipanje vrijednosti vergencija, kao i nerazvijenost pripadajućih antiformi, ukazuju da deformiranje boksitne krovine nije izazvano egzokinetičkim tektonskim silama. Deformacije nisu posljedica ni sedimentacijskih procesa. Nastale su prevagom gravitacijskog stresa nakon poremećene hidrostatske ravnoteže litificiranih sedimenata i predstavljaju velike kolapsne strukture.

Zbog sukcesivnih kolapsnih događaja, od sloja u sloj, formirale su se uređene sinklinalne strukture, a ne kaotične strukture jednokratnog kolapsa.

S orijentacijom dviju glavnih osi struktura podudaraju se i dva pravca paleotransporta laminiranih biomikrita — prema sjeveroistoku i prema jugoistoku. To su dva krajnja pravca generalnog dotoka paleogenske transgresije sa zapada, po prirodnim putovima dva paleokanjonska sistema postkredne karstifikacije.

Hanging walls of bauxite beds in paleorelief pits are made up of Paleocene — Lower Eocene laminated biomicrites with a channel-type of sedimentation. Beds are deformed in compressed synclines, having two kinds of B-axis orientation, with a gentle dip towards north-east or south-east.

Different axis orientations, a complete scatter of vergence values, as well as the underdeveloped state of associated antiforms, point to the fact that the bauxite hanging wall deformation has not been caused by exokinetic tectonic forces, nor are deformations an effect of sedimentation processes. They originated due to the preponderance of gravitational stress after a disturbance in the hydrostatic equilibrium of lithified sediments, representing large collapse structures.

Due to successive collapse occurences, from a stratum to stratum, ordered syncline structures have formed, rather than chaotic single-collapse structures.

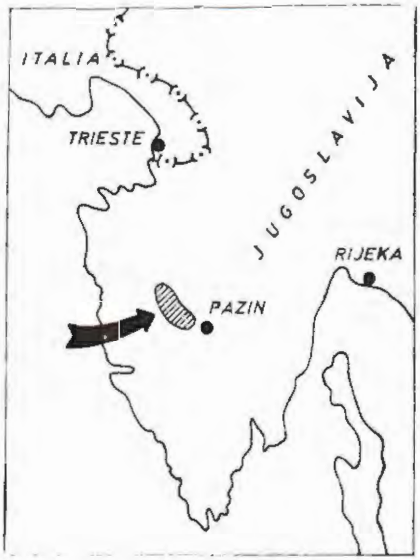
Two paleotransport directions of laminated biomicrites correspond as well with the orientation of major structure axes, i.e. due north-east and south-east. These are two outermost directions of the general Paleogene transgression inflow from the west, following natural routes of two paleocanyon systems of postcretaceous karstification.

UVOD

Na području između Pazina i Vižinade u centralnoj Istri (Sl. 1), boksitna se ležišta nalaze kao ispune dna jama u vrlo izraženom postkrednom reljefu albsko-cenomanskih vapnenaca.

Jame se obično pojavljuju na presjecištima dva dominantna sistema tenzionih pukotina formiranih u laramijskoj tektonskoj fazi. Jedan je pružanja oko 30°, a drugi oko 130°, pa se sijeku približno pod pravim kutom, tvoreći tokom kredne emerzije duboko karstificiranu mrežu paleokanjona i gudura.

Zbog takvog položaja ležišta, boksiti se vrlo rijetko pojavljuju na danu, pa je jedina indikacija mjesta odgovarajuće paleokartifikacije, od-



Sl. 1 Skica položaja lokaliteta.
Fig. 1 Sketched locality position.

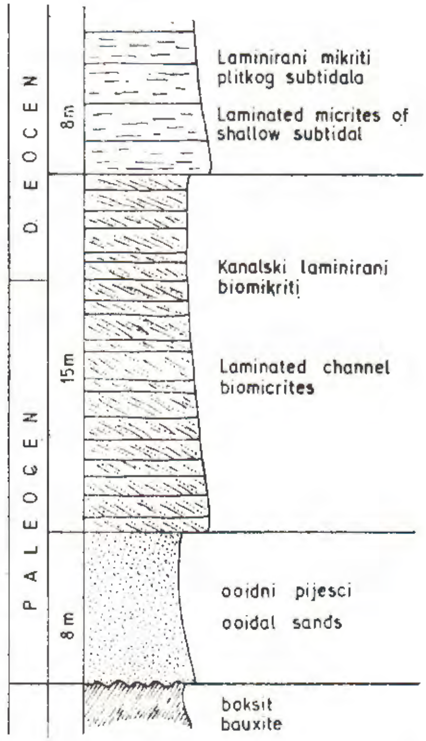
nosno jame s eventualnim boksitom, blago ljevkasto ulegnuti strukturni bazen dekametarskog promjera u subhorizontalnim donjoeocenskim slojevima. Put do boksita je bio iskapanje ponekad i 20 m debele krovine da bi se došlo do 6000 ili 2000 t rude.

Istraživanja u okviru ovog rada sufinancirana su od Republičke samoupravne interesne zajednice za znanstveni rad.

SEDIMENTACIJSKI OKOLIŠ

Paleokanjoni su bili prvi prirodni putovi napredovanja paleogenskog mora na postkredno kopno, pa ujedno i prva mjesta sedimentacije paleogenske transgresije.

Na boksitima se taloži 5—8 m debela serija neuslojenih, slabo vezanih zaglinjenih ooidnih pijesaka (Sl. 2). Na zaglinjenim pijescima, kontinuirano ali s oštrom granicom, slijedi 10—15 m debeli stup dobro uslojenih (10—40 cm) biomikrita s vrlo finim milimetarskim kosim laminacijama izgrađenim od izmjene kriptalgalnih i mikritskih lamina. Lamine često sadrže sitne, okršene, transportirane i imbricirane fragmente razorenih kriptalgalnih lamina i okršene, u mulj omotane ostatke foraminifera. U svakom se sloju redovito pojavljuju i 2—3 mala, centimetarska tempestitna ritma s nešto krupnijim transportiranim i imbriciranim fragmentima.



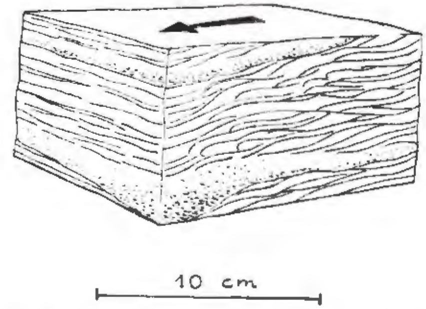
Sl. 2 Shematski stup paleogenskih slojeva u krovini boksitnih jama.

Fig. 2 Schematic column of paleogenic strata in the overburden of bauxite pits.

Na presjeku paralelnom s pravcem transporta lamine su nagnute prosječno pod kutom od 15°, dok se na presjeku normalnom na pravac transporta vide kao paralelne laminacije (Sl. 3).

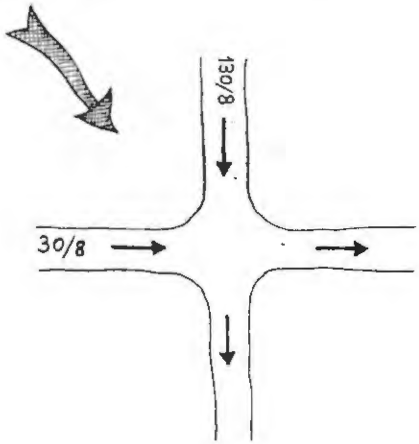
Palinspastička rekonstrukcija pokazuje da je primarna morfologija laminiranih biomikritskih slojeva vrlo blago konkavkoveksna nadole — deblji dio bliže osi, a tanji prema bokovima. U većini slučajeva ne isklinjuju potpuno, nego se približno s 1/4 od najdebljeg dijela, prislanjaju na bokove kanjona.

Iz tehničkih je razloga nedostupno finije praćenje vertikalne i lateralne promjene sastava i strukturne građe slojeva. Međutim, na temelju općeg strukturnog tipa laminiranih biomikrita, teksturnih karakteristika, morfologije slojeva, orijentacije kose laminacije, pa konačno i morfologije stare podloge, može se reći, da ove naslage pripadaju kanalskom tipu sedimentacije u plitkom subtidalu, za vrijeme paleocena — donjeg eocena [sadrže: *Coskinolina (Coskinolina) liburnica* Stache, *Chrysalinida*



Sl. 3 Presjek uzorka kanalskog laminiranog biomikrita.

Fig. 3 Section through the sample of a channel laminated biomicrite.



Sl. 4 Smjerovi kanalskog transporta generalne transgresije.

Fig. 4 Channel transport directions of general transgression.

(Chrysalinida) alva Silvestri, *Spirolina cylindracea* Lamarck, *Idalina sinjarica* Grimsdale, ostaci harofita].

Osim povremenog oslađivanja (harofiti!), najprisutnije je obilježje stalnog pritjecanja vodenim medijem nošenog mulja i finih čestica, u istom smjeru. U stvari, dva smjera, dva kanalska sistema, sinhronog transporta po prirodnim putovima zadate paleomorfologije — jedan s nagnutom osi prema sjeveroistoku (30/8), a drugi prema jugoistoku (130/8). To su ujedno dva krajnja moguća smjera generalnog dotoka koji ukazuju da je detritus paleogenske transgresije, barem za područje Istre, dotjecao sa zapada (Sl. 4).

Nakon laminiranih biomikrita kanali se ispunjuju, pa se kontinuirana sedimentacija nastavlja u širokom lateralnom komuniciranju u uvjetima karbonatnog šelfa. Talože se oko 40 cm debeli slojevi laminiranih mikritskih vapnenaca plitkog subtidala s rijetkim puževima paleogenskog roda Cosinia.

MEHANIZAM DEFORMIRANJA

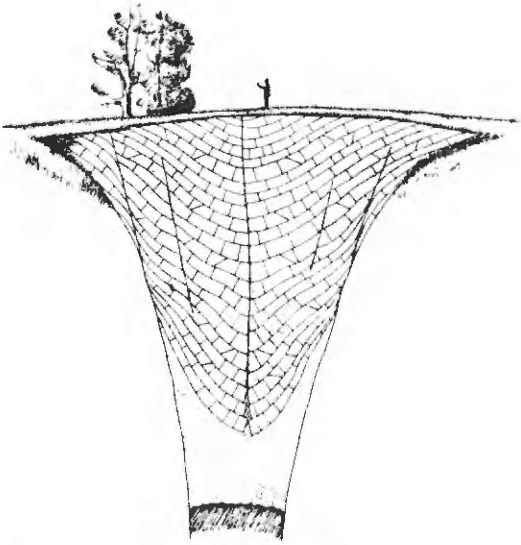
Opisane se naslage nalaze uklještene u paleokanjonima (Sl. 5) tako da tvore jače ili slabije stisnute sinklinalne forme koje morfološki podsjećaju kao da su nastale pod djelovanjem egzokinetičkih tektonskih pokreta. Međutim, pokazat će se kako ove deformacije identičnih naslaga nemaju nimalo slične konstitucijske strukturne elemente:

(1) Budući da su deformacije vezane uz dva navedena sistema kanala, tako im i strukturne osi stoje jedna prema drugoj u istoj ravnini približno pod 90° (Sl. 6).

(2) Simetralne ravnine deformiranih sklopova, od jame do jame iskazuju različite vrijednosti vergencija, i po smjeru nagiba i po veličini nagiba (Sl. 6).

(3) Svaka struktura ima svoj specifični indeks stisnutosti koji se ne mogu međusobno uzročno povezati.

(4) Ove sinforme, nemaju svoje pripadajuće antiforme — povezuju ih subhorizontalni donjoeocenski slojevi.



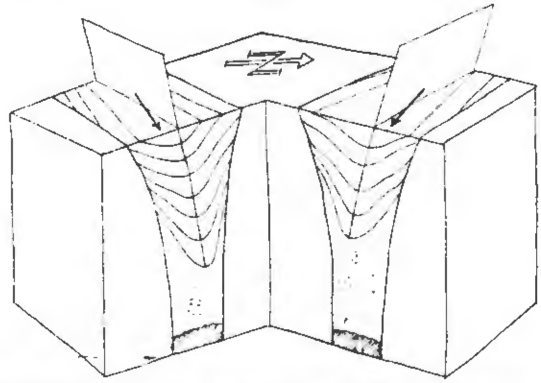
Sl. 5 Skica sinklinalne strukture paleogenskih slojeva u krovini boksitne jame s pružanjem B-osi prema sjeveroistoku. Sistemi tenzionih i kliznih pukotina i gravitacijski rasjedi. Selo Škropeti (Karojba).

Fig. 5 Sketched synclinal structure of paleogenic strata in the bauxite pit overburden with a B-axis strike towards north-east. Systems of tenesion and slide fractures and gravitational faults. Village Škropeti (Karojba).

(5) Iako je deformirani sklop homogenog litološkog sastava, njegove tenzione pukotine iz zone osne ravnine, nemaju očekivanu geometriju podudarnu s klivažom osne ravnine. Zauzimaju položaj kao da se radi o diferencijalnom klivažu, što je besmisleno govoriti u ovim primjerima, gdje se ne izmjenjuju kompetentni i inkompetentni slojevi (Sl. 7, A, B).

Međutim, ako se zamjene teze; umjesto diskontinuiteta u prostornom sastavu slojeva, sličan bi diferencijalni klivaž trebao proizvesti i vremenski diskontinuirano djelovanje deformacijskih sila — od sloja u sloj.

Ovaj mogući aspekt tumačenja jedinog zajedničkog strukturnog svojstva svih ovih deformacija, kao i s druge strane, nedostatak bilo kojeg podudarnog konstitucijskog elementa, suzili su prostor analize geneze deformacija prema endokinetičkim procesima. Ovo su individualizirani događaji koji i onda, kada su slučajno doslovno istovremeni, na svakom

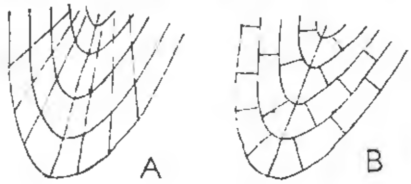


Sl. 6 Odnos strukturnih elemenata sučeljenih kanalskih sedimenata nad boksitnom jamom.

Fig. 6 Relation of structural elements of confronted channel sediments above a bauxite pit.

primjerku predstavljaju autohtone kinematske aktove. Zbog toga je izlišno pitanje o mogućnosti sudjelovanja više kinematskih faza u formiranju ovih specifičnih strukturnih orijentacija.

Pažnja je u prvom redu usmjerena na sinsedimentacijske procese kompakcije sedimenata u toku dijageneze. Naime, primarni konkavkonveksni oblik slojeva već podsjeća na gravitacijsko utiskivanje otežalih centralnih dijelova kanalskih sedimenata koji iz sloja u sloj sve više pristišću pješčanu podlogu. Lako zamisliv proces koji već naslućuje deformaciju poput supratenuozne sinklinale (Whitten, 1969), ali ne i njezin maksimalni današnji oblik.



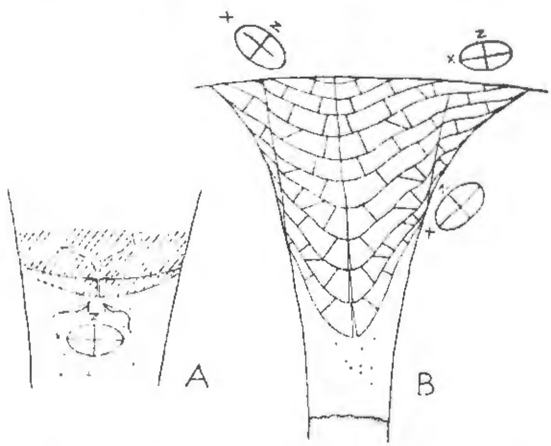
Sl. 7 »Lepezaste« pukotine (A) i »diferencijalne« pukotine (B).

Fig. 7 »Fan-type« fractures (A) and »differential« fractures (B).

Uz postanak ovih deformacija neizbježno je povezati ranije spomenutu zajedničku pojavu slično uvjetovanih specifičnih tenzionih pukotina. Iako su već po svojoj prirodi otvorene, ni u kom horizontu slojeva nisu ispunjene nastupajućim mlađim sedimentima novog sloja. Što znači, da se cijeli stup kanalskih sedimenata i njegove subtidalne krovine, morao odsedimentirati, proći dijagenezu, litificirat se i zaći u krustalnu fazu, održavajući hidrostatsku ravnotežu i položaj slojeva kakve su proizveli sedimentacijski procesi. Tek nakon toga, u nekom kasnijem vremenu, u svakom slučaju poslije donjeg eocena, moglo je doći do endokinetičkim procesima izazvane tenzije i jednostavno — do kolapsa boksitne krovine. Dakle, nešto je moralo poremetiti hidrostatsku ravnotežu, usmjeriti pritisak na tenziju i izazvati kolaps.

Kao što je ranije rečeno, bazu kanalskih laminiranih biomikrita, izgrađuju zaglinjeni ooidni pijesci koji su primarno bili natopljeni konatnom vodom. Danas su to stlačeni pijesci svijetlosmeđe obojeni od boksita, a o njihovom nekadašnjem velikom sadržaju konatne vode znamo posredno: uz kontakt s prvim slojevima kanalskih biomikrita, u pijescima su razvijene decimetarske »teksture istiskivanja vode«. Osim toga, donja trećina strukture laminiranih biomikrita, ima svijetlooker boju koja je očito donešena konatnom vodom iz pješčanog člana.

Može se reći, da je kolapsu najvjerojatnije prethodilo polagano izdizanje konatne vode iz pijeska u biomikrite kapilarnim silama. To je s vremenom izazvalo materijalni manjak u volumenu baze, pa zato i prevagu gravitacijske sile nad hidrostatskom ravnotežom (Sl. 8, A).



Sl. 8 Pretkolapsna situacija (A) i kinematska slika kolapsa (B) s tenzionim i kliznim pukotinama i gravitacijskim rasjedima

Fig. 8 Pre-collapse situation (A) and kinematic picture of collapse (B) with tension and slide fractures and gravitational faults.

U području gdje je gravitacijskim stresom došlo do najveće tenzije, a to je središnji dio prvog biomikritnog sloja, dolazi do kidanja paralelno s osnom ravninom i propadanja slojeva u pijeske. Po inicijalnoj tenzionoj pukotini, konatnoj se vodi otvara brži put nagore. Počinje lanac sukcesivnih kolapsa koji napreduju oslobađanjem tenzione napetosti od sloja u sloj, odozdo nagore i od osi prema bokovima.

Sve se tenzione pukotine otvaraju samo unutar sloja. Pojavljuju se onim slijedom kako ih je upravila promjena debljine slojeva, pa tako svaki sloj ponavlja svoju zasebnu grupu tenzionih pukotina i svoje specifične elipsoide deformacija, odnosno svoju kinematiku (Sl. 8, B). Ovaj se proces, na ukupnoj geometriji forme odražava kao »diferencijalni klivaž«, izazvan vremenski diferencijalnom tenzijom.

Zahvaljujući ovakvom mehanizmu sukcesivnog slijeda serije manjih kolapsa, da rečemo diferencijalnih kolapsa, a ne jedne epizode, nisu nastale uobičajene kaotične strukture (Salome, 1986, Mylroie, 1987), nego na stanovit način uređene sinklinalne deformacije.

U kontinuiranom se nizu deformiranja, iz sloja u sloj ponavlja mjesto sličnih kinematskih uvjeta koji generiraju jedinu zajedničku pukotinu okomitu na sve slojeve strukture — realnu osnu ravninu. Budući da se otvara odozdo prema gore kao tenziona pukotina, njezina napuštena mjesta tenzije slijedi gravitacijsko spuštanje, pa retroaktivno funkcionira kao gravtiacijska (hOl) pukotina.

Mada je u inicijalnom stadiju ovog procesa, tenzija primarni kinematski akt, klizne se pukotine pojavljuju u konjugiranim parovima kao logičan kinematski spreg, usko povezan ili istovremen s tenzionim pukotinama (Sl. 8, B). Tek se u uznapredovanom procesu, prema završetku kolapsnih epizoda, formiraju gravitacijski rasjedi po kliznim pukotinama subparalelnim s bokovima kanjona.

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Collapse structures in bauxite pits of Istria

S. Marinčić & D. Matičec

INTRODUCTION

In the area between Pazin and Vižinada in central Istria (Fig. 1) bauxite deposits occur as fills in pit bottoms in a very pronounced post-cretaceous relief of Albian-Cenomanian limestones.

Pits generally appear at intersections of two dominant tension fracture systems, formed in the Laramian tectonic phase. One of the two has the strike of about 30° and the other of about 130°, so that they intersect under approximately right angle, creating during the period of cretaceous emergence a deeply karstified network of paleocanyons and gorges.

Due to such position of beds, bauxites very rarely appear in the open; the only indication of the appropriate paleokarstification, i.e. of a pit with a possibility of bauxite, being midlly funnel-shaped structural basins of decametric diametre in subhorizontal Lower Eocene beds. The way to reach the bauxite was cutting through sometimes no less than 20 m thick overburden, in order to get 6000 or 2000 tones of ore.

Investigations within the frame of this paper were co-financed by the Republican Self-Management Community of Interest for Scientific Work (Republička samoupravna interesna zajednica za znanstveni rad).

SEDIMENTATION ENVIRONMENT

Paleocanyons had been first natural advance routes of paleogene sea onto post--cretaceous dry land, being also the first areas of the paleogenic transgression's sedimentation.

A 5 — 8 thick series of unstratified, poorly bound, ooidic sands is deposited over bauxites (Fig. 2). Over clayey sands follows continuously, but with a sharply defined boundary, a 10—15 m thick column of well stratified (10—40 cm) biomicrites, with very fine millimetric dipping laminations, made up of an alteration of cryptoalgal and micritic laminae. Laminae often contain tiny, detrital, transported and imbricated fragments of destroyed cryptoalgal laminae, as well as detrital remains of foraminiferae, enveloped in silt. As well, in each bed regularly appear 2—3 small tempestite rhytms with somewhat coarser transported and imbricated fragments.

In the section parallel to the direction of transport laminae dip averagely under an angle of 15°, while in the section normal to the direction of transport they can be seen as parallel laminations (Fig. 3).

The palinspastic reconstruction shows that the primary morphology of laminated biomicrite beds is very mildly concave-convex downwards — the thicker part being nearer to the axis and the thinner one towards sides. In most of the cases they do not wedge out completely, but lean against sides of the canyon with approximately 1/4 of the thickest part.

Due to technical reasons, a finer following of vertical and lateral changes in the composition and structural build of beds is unattainable. It can he however said that, on the basis of the general structural type of laminated biomicrites, texture characteristics, bed morphology, the dipping lamination orientation and, finally, the morphology of the old base, these beds belong into the channel type of sedimentation in the shallow subtidal during Paleocene — Lower Eocene (containing: Coskinolina (Coskinolina) liburnica Stache, Chrysalinida (Chrysalinida) alva Silvestri, Spirolina cylindracea Lamarck, Idalina sinjarica Grimsdale, remains of Charophyta].

Apart from periodical sweetening (Charophyta!), the most present characteristic is an inflow — via water medium — of shifted silt and fine grains, following the same direction. In fact, two directions, two channel systems of synchronous transport along natural routes of given paleomorphology — one with the axis inclined due north-east (30/8) and the other due south-east (130/8). These are at the same time the two extremely possible directions of general inflow and they indicate that the beginning of paleogenic transgression, at least in the area of Istria, has had an inflow from the west (Fig. 4).

After laminated biomicrites, channels fill in, so that the continuous sedimentation goes on in a wide lateral communication in conditions of carbonate shelf. There is a deposition of about 40 cm thick beds of laminated micrite limestones of shallow subtidal, with rare snails of the paleogenic Cosinia genus.

DEFORMATION MECHANISM

The described deposits find themselves wedged-in in paleocanyons (Fig. 5), thus making harder or poorer compacted synclinal forms, which morphologically hint as if they were created under the action of exokinetic tectonic movements. It will be however shown that these deformations of identical deposits do not possess similar constitutional structural elements at all:

(1) because deformations are tied up to the two mentioned channel systems, so that their structural axes also find themselves one towards the other in the same plane, approximately under 90° (Fig. 6).

(2) Symmetry planes of deformed fabrics from pit to pit demonstrate various values of vergences regarding both, the strike and the magnitude of dip.

(3) Each of structures has its own index of compaction and these cannot be causally linked together.

(4) These synforms do not possess their associated antiforms — they are linked by subhorizontal Lower Eocene beds.

(5) Although the deformed fabric has a homogeneous lithological composition, its tension fractures from the axis plane zone do not have the expected geometry, corresponding to the axis plane cleavage. They are in a position as if this is the matter of differential cleavage; an unreasonable proposition in present examples, where competent and incompetent beds do not alternate (Fig. 7, A, B).

However, were the theses exchanged, the similar differential cleavage should, instead of discontinuity in the spatial composition of beds, also produce a periodically discontinuous action of deformation forces — from one bed to the other.

This possible aspect of interpreting the single structural characteristic common to all these deformations, together with the absence of any corresponding constitutional element on the other hand, narrows the analysing space for the genesis of the deformation in accordance with endokinetic processes. These are individualised occurences, which, even when they are, accidentally, literally concurrent, represent autochtonuous kinematic acts in every example. The question about a possibility that a number of kinematic phases took part in forming these specific structural orientations becomes therefore superfluous.

The attention is primarily directed towards synsedimentational processes of compacting the sediments within the period of diagenesis. Namely, the primary concave-convex form of beds is already associative of gravitational impressing of weighed central parts of channel sediments, which, from bed to bed, press more and more into the sand base. An easily imagined process, which already forebodes the deformation like a supratenuous syncline (W h i t t e n, 1969), but not its present maximal form.

It is invitable to link the creation of these deformations with the already earlier mentioned common occurence of similarly conditioned tension fractures. Although being open by their very nature, they are not filled-in by advancing young sediments of the new bed along any of the bed horizons. The meaning of this is that the whole column of channel sediments and its subtidal overburden have to finish sedimentation, go through the diagenesis, lithify itself and enter the crustal phase, keeping the hydrostatic equilibrium and position of beds such as produced by sedimentation processes. Only after this, at some later time, in any case later than Lower Eocene, could occur the tension caused by endokinetic processes and, simply — the collapse of bauxite overburden. Consequently, something must have disturbed the hydrostatic equilibrium, direct the pressure on the tension and induce the collapse.

As previously said the base of channel laminated biomicrites is made up of clayey ooidic sands, which were primarily soaked with the connate water. Today there are compacted sand, which has acquired a light brown colour from the bauxite and our knowledge of their former large contents of connate water has been acquired indirectly: decimetric »water-escape structures« are developed in sands along the contact with first beds of channel biomicrites. Besides, the lower third of the laminated biomicrites' structure has a light ochre colour, obviously carried in by the connate water from the sandy member.

It can be said that the collapse had been probably preceded by a slow rising of connate water from sands into biomicrites by means of capillary forces. This had, in time, induced a material deficit in the base volume and, consequently, a prevalence of the gravitational force over the hydrostatic equilibrium (Fig. 8, A).

Within the area in which the largest tension occured due to the gravitational stress, that area being the central part of the first biomicrite bed, breaking parallel to the axis plane happens and beds collapse into sands. The connate water finds a speedier route upwards along the initial tension fracture. Begins a chain of successive collapses, advancing, as the tension releases, from bed to bed, from below upwards and from the axis towards sides.

All tension fractures open up only within the bed. They appear in such a sequence as direct by the change in thickness of beds, so that each bed repeats its separate group of tension fractures and its specific ellipsoids of deformation, namely its kinematics (Fig. 8, B). This process reflects itself upon the total geometry of form as a »differential cleavage«, induced by the temporally different tension.

Thanking to such mechanism of successive sequence of lesser collapse series, so to speak, differential collapses, rather than a single episode, the usual chaotic structures have not been formed (S a l o m e, 1986; M y l r o i e, 1987), but syncline deformations, arranged in a certain way.

Within the continuous, bed to bed, series of deforming a spot of similar kinematic conditions repeats itself and they generate a single common tension fracture from below upwards. It passes through a plane normal to all structural beds, being therefore the real axis plane at the same time.

Although in the initial stage of the process the tension is the primary kinematic act, slide fractures occur in conjugated pairs, as a logical kinematic conjunction, narrowly linked with or simultaneous with tension fractures (Fig. 8, B). Gravitational faults along slide fractures subparallel with the canyon sides form themselves only in the advanced process, nearing the end of collappsing episodes.

1

Fot. — Photo 1

Kolapsna struktura kanalskih sedimenata krovine boksita s pružanjem B-osi prema sjeveroistoku. Selo Škropeti (Karojba).

Collapse structure of channel sediments in bauxite overburden with B-axis strike towards north-east. Village Škropeti (Karojba).

Fot. — Photo 2

Kolapsna struktura kanalskih sedimenata krovine boksita s pružanjem B-osi prema jugoistoku. Selo Škropeti (Karojba).

Collapse structure of channel sediments in bauxite overburden with B-axis strike towards south-east. Village Škropeti (Karojba).

3

Fot. — Photo 3

Plitki paleokanjon s tankom serijom pijesaka u bazi kanalskih biomikrita. Zbog toga nije izražen kolapsni proces, pa su biomikriti zadržali skoro sinsedimentacijsku formu supratenozne sinklinale. Selo Škropeti (Karojba).

Shallow paleocanyon with thin series of sands in the base of channel biomicrites. Due to this collapse process is not marked and biomicrites kept their almost syn sedimentation form of supratenuous syncline. Village Škropeti (Karojba).

Fot. — Photo 4

Teksture »istiskivanja vode« u pijescima u bazi kanalskih biomikrita. Selo Škropeti (Karojba).

»Water-escape« structures in sands in the base of channel biomicrites. Village Škropeti (Karojba).