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Žljebasti tektoglifi

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Terenskim ispitivanjem žljebastih tektoglifa na području Istre, te eksperimentalnom provjerom mogućnosti njihove pojave, opisana je morfologija, geneza i uvjeti postanka ovih specifičnih tektonskih tragova a-lineacije. Iznešena su zapažanja u kojoj mjeri ovi feomeni ukazuju na slijed i stupanj tektonskih poremaćaja izazvanih konkretnim kinematskim aktom, te na mogućnosti ocjene veličine ukupnog kretanja, kao i način određivanja smjera relativnog kretanja krila rasjeda.

A field investigation of gutterlike tectoglyphs in the Istrian Peninsula area and an experimental verification of the possibility of their occurence were used to describe the morphology, genesis and conditions of formation of these specific tectonic tracings of a-lineation. A commentary is given to what extent these phenomena point to both the sequence and the degree of tectonic disturbances induced by a particular kinematic act, as well as to possibilities to asesss the total displacement extent and to the manner of determination of the fault wall's relative direction of displacement.

UVOD

Naziv »tektoglif« upotrebljavaju S. Džulynski & J. Kotlarczyk (1965) kao već opisani termin od W. Teisseyre-a, a u novijoj literaturi J. P. Petit et al. (1983). Čini se da je ovaj termin prihvatljiviji, jer neposrednije opisuje pojave mehaničkih tragova nastalih kretanjem krila rasjeda, tzv. »a — lineaciju«, nego uobičajeni široki pojam »strija«.

Za razliku od dobro proučenih standardnih tektoglifa (na pr. Džulynski & Kotlarczyk, 1965; Petit et al., 1983) prepoznatljivih po karakterističnim izbočenim brazdama izduženim po pravcu kretanja rasjednih krila, ovdje će biti riječi o morfologiji i genezi nešto rjeđe pojave tektoglifa izraženih udubljenim kanalima, odnosno žljebovima.

Opažanja su izvršena u malmskim vapnencima kod Rovinja (Zlatni Rat) i u krednim vapnencima Učke (Petnički Vrh). Na oba lokaliteta, mehanički tragovi su izazvani međuslojnim kretanjem, pa su opažanju pristupačni isključivo na površini podinskog krila (sloja), dakle samo kada je krovinsko krilo erodirano. Takva je situacija ostavila prostor dilemi: da li se uopće može u potpunosti sagledati proces i sav njegov značaj, ako se raspolaže tek polovinom informacije. Naime, bilo je potrebno napustiti statički dojam, da se na ovu »negativ — formu« gleda kao na posljedicu sličnog »pozitivnog oblika«. Osnovne su smjernice dali prvi opisi sličnih fenomena u pješčenjacima krednog fliša Karpata koje Dżułynski & Kotlarczyk (1965) nazivaju »tragovima zadiranja«.

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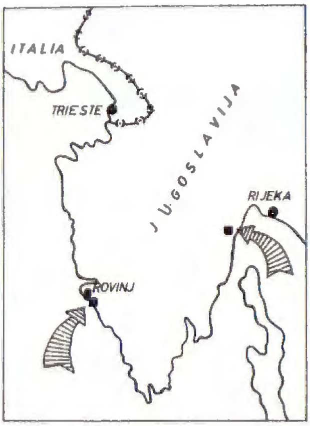


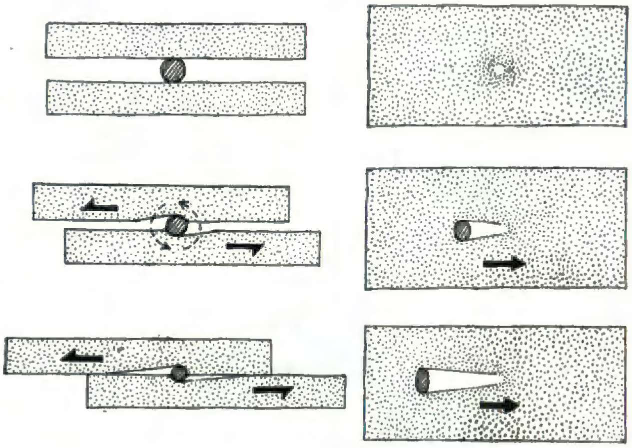
KARTA LOKALITETA
LOCATION MAP

EKSPERIMENT

Da bi se ostvarila mogućnost etapnog praćenja mehanizma fizičkih promjena, simulirani su približni prirodni uvjeti koji bi mogli izazvati slični efekt. Kao čvršći abrazivni materijal, položena je kuglica pisaće krede između dvije voštane ploče koje su se uz stalni pritisak ruke međusobno razmicale (kretale) po jednom pravcu.

Kuglica je ili rotirala i pri tom ucrtavala trag zadiranja na gornjoj i donjoj voštanoj ploči (Sl. 1, A) ili pak, ako se uglavila u gornjoj ploči ucrtavala je trag zadiranja samo na površini donje ploče. Trag vrlo sličan onom u prirodi — na početku kretanja plitki i uski »rep«, prema sve dubljem i širem »čelu« na kojem dosta oštro prestaje trag u trenutku kada ostatak kuglice potpuno zadre u krilo (ili krila) i izgubi efektivnu masu, a krila se priljube i nastave kretanje bez ovog dodatnog otpora. Nastavkom kretanja počinje zaglađivanje i brisanje ovog početnog crteža.

Zanimljivo je primjetiti, da na konačni efekt eksperimenta bitno ne utječu ograničene mogućnosti održavanja stalnosti pritiska rukom — redovito se dobro raspoznaje karakteristična morfologija prirodnog udubljenog, odnosno žljebastog tektoglifa. Promatrano u vremenskim etapama (Sl. 1, B): na početku kretanja kuglicu počinju pritiskati voštane ploče dodatnom silom, uslijed čega se plitko utiskuje u krila svojim užim presjekom. Napredovanjem kretanja, kuglica počinje rotirati, pa se izdužuje po b — osi (R — tektonit) i ucrtava širi trag. Istovreme-



Sl. 1. Rotacija i usjecanje kuglice razmicanjem pločica (A) i utiskivanjem traga u donjoj pločici (B).

Fig. 1. The globule rotates and ploughs as a result of the displacement of plates (A), leaving a prod mark in the lower plate (B).

no, zbog porasta kompakcije rotirajućeg materijala, povećava mu se i abrazivna sposobnost, pa je trag sve dublji, da bi naglo završio najdubljim dijelom koji odsječenim oblikom i s ostatkom krede, dobro markira b — lineaciju.

Kod prirodnih žljebastih tektoglifa b — lineacija je još jače izražena oštrim završetkom udubljenja u kojima je često sačuvan kataklazirani materijal rotirajućeg tijela ili čestica krovinskog krila.

Ovim se priručnim eksperimentom ne može neposredno pratiti mehanizam promjena kod slučaja kada se kuglica fiksira u jedno krilo. Vjerojatno i tada abraziju modificiraju otrgnute rotirajuće čestice fiksirane kuglice, jer je trag identičan i iskazuje iste vrijednosti, makar samo na jednom krilu.

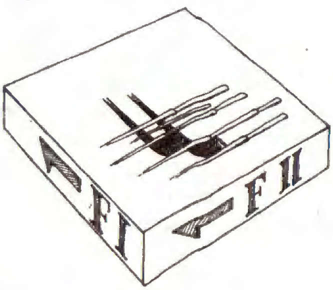
VEZA IZMEĐU ŽLJEBASTIH I OBIČNIH TEKTOGLIFA

Na mjestima gdje se pojavljuju, žljebasti su tektoglifi masovna pojava. To je i razumljivo, budući da bi se uslijed velikih pritisaka, pojedinačni fragment dezintegrirao prije nego što bi ostavio ikakav primjetljiviji trag. Osim toga, zapaženo je da su ove rasjedne plohe slabo tektonski izmijenjene, pa nemaju osobine »gorskog zrcala« (harniša) i naoko zadržavaju izgled normalnih međuslojnih ploha (Sl. 5, A, B). Međutim, na pojedinim dijelovima iste rasjedne površine međuslojnog kretanja, gdje je zbog prirodnih neravnina slojnih ploha, ranije došlo do neposrednog kontakta razmicanih slojeva (krila), tektoniziranje je uznapredovalo u početak stvaranja harniša. Na ovim mjestima nema žljebastih tektoglifa, ali se zato pojavljuju prvi, slabije izraženi, standardni brazdasti tektoglifi.

Moglo bi se reći, barem za ovo područje, da jedan česti varijetet žljebastih tektoglifa u obliku lule, redovito naznačava i početak jačeg tektoniziranja. Ove su »lulaste« forme urezane kao zakrivljeni trag kontinuiranog prijelaza kretanja iz I faze u II kinematsku fazu višeg stupnja tektoniziranja. Kulminacija lulastog tektoglifa prestaje njegovim čelom u smjeru u kojem se više ne pojavljuju nikakve žljebaste forme — to je smjer prvih brazdastih tektoglifa (Sl. 2, 3).

Sl. 2. Zakrivljeni trag kontinuiranog prijelaza kretanja iz jedne faze (F I) u drugu kinematsku fazu (F II), te prekid usjecanja »lulaste« forme tektoglifa kad R-tektonit dođe do žlijeba.

Fig. 2. The curved trace of a continuous transit of the displacement from one (F I) to another (F II) kinematic phase, as well as the »tobacco-pipe«-shaped tectoglyph's termination of ploughing at the moment when the R-tectonite reaches the gutter.

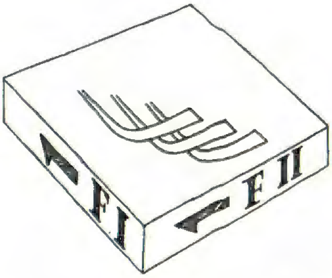


Sl. 3. Položaj i slijed običnih brazdastih tektoglifa u odnosu na »lulaste« forme.

Fig. 3. The situation and strike of common ridge tectoglyphs as related to »pipe-like« forms.

Očito je, da su žljebasti tektoglifi posljedica prvih otpora kretanju koje teži uređenju sklopa rasjeda iz jedne specifične zatečene situacije. Ovaj se predcrtež u punoj mjeri može očekivati upravo kod međuslojnog kretanja. S jedne strane, naglašeni fizički diskontinuitet slojeva omogućava urušavanje dijelova baze krovinskog sloja koji će funkcionirati kao R-tektoniti. A budući da su ovi vapnenci često graduirani, baza krovinskog sloja može sadržavati dijagenetskim procesima stvorene manje izbočine koje će u početku kretanja lako abradirati vršni mikritni dio podinskog sloja.

Dakle, može se reći da su žljebasti tektoglifi tragovi inicijalnih kretanja, međutim, to ne znači da se mogu automatski poistovjetiti s tragovima prve faze pokreta promatranog objekta. Oni to mogu biti ali ne moraju, jer ponovljeni slični preduvjeti stanja krila, mogu stvoriti na istoj plohi u nekom novom kinematskom aktu, nove inicijalne žljebaste tektoglife.



Sl. 4. Idealizirani prikaz usjecanja R-tektonita kod promjene smjera kretanja kad se ne bi zaustavljao na ranije formiranim žljebovima.

Fig. 4. An idealised illustration of the R-tectonite's ploughing in a case it was not stopped at earlier formed gutters when the direction of movement changes.

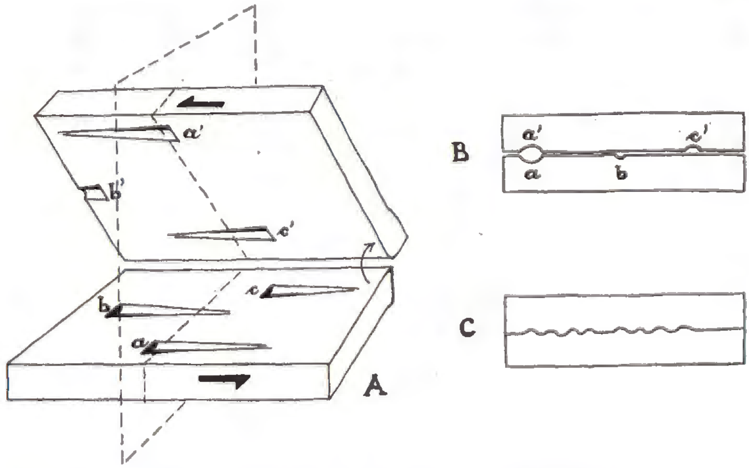
Kao što se lako susreću na plohama međuslojnog kretanja zbog prirode njihovog mehanizma postanka, ove bi se pojave mogle vrlo rijetko nalaziti i na plohama klasičnih rasjeda koji sjeku homogene slojeve istovrsne serije. U ovim slučajevima, lokacija rasjeda nije predisponirana fizički »slabim mjestom« geološkog tijela, koliko distribucijom dinamičke sile. Budući da je sastav, struktura i tvrdoća oba krila identična, to nema ni u kojoj komponenti preferiranog krila. Neposrednim procesom počinje stvaranje gorskog zrcala na kojem se mogu formirati i tektoglifi, ali samo recipročne forme u oba krila — standardni brazdasti tektoglifi (Sl. 5, C).

Žljebasti bi tektoglifi na ovom rasjedu mogli nastati tek u poodmakloj fazi tektoniziranja; kad bi se u otvoreni prostor među krilima uklopili R-tektoniti nove kinematske faze.

O MOGUĆNOSTI OCJENE VELIČINE UKUPNOG KRETANJA

Zbog svoje impresivno ucrtane i zatvorene forme, žljebasti tektoglif snažno sugerira ukupnu dužinu kretanja krila. Nažalost, dužina ovog mehaničkog traga odgovara tek dužini trajanja zapreke kretanju, odnosno vremenu od kada je došla u stanje da stvara otpor kretanju krila, do svoje materijalne dezintegracije.

Budući da su, u ovom konkretnom slučaju, peritidalni karbonatni slojevi šelfa, po sastavu i debljini praktički nepromjenjljivi desetak kilometara, na rezultate kretanja ovih golemih krila, odrazit će se svaka i najmanja promjena kvalitete međuslojnog diskontinuiteta. Naime, tokom trajanja kretanja neće sve točke u zoni diskontinuiteta istovremeno imati i iste uvjete. Pojedina će tijela neizbježno počinjati svoje zadi-



Sl. 5. Shematizirani izgled žljebastih tektoglifa u krilima (A), presjeku krila (B), te presjek krila »gorskog zrcala« s brazdastim tektoglifima (C).

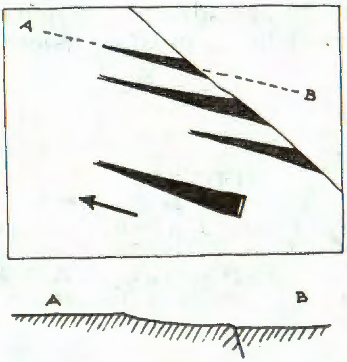
Fig. 5. A shematic view of gutterlike tectoglyphs upon walls (A) and in the cross-section of walls (B) and in the cross-section of a »slickenside« with ridge tectoglyphs (C).

ranje u različitim vremenima, pa tako i prestajati u različitim vremenima. Zbog toga, vrednovanje ograničenog okvira izdanka (pa i u slučaju klasičnog rasjeda) ne dozvoljava nikakav ozbiljniji zaključak o veličini ukupnog kretanja. I kad bi bila dostupna inventura cijelog krila, ne bi se moglo ništa više afirmativnog reći, osim da krila nisu kretana manje nego što iznosi dužina najvećeg žljebastog tektoglifa.

ŽLJEBASTI TEKTOGLIFI KAO INDIKATORI STARIJIH TEKTONSKIH POREMEĆAJA

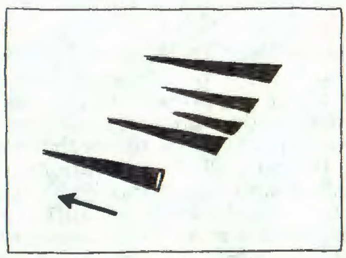
Osim lake mogućnosti utvrđivanja smjera relativnog kretanja krila rasjeda, kao i stupnja tektonskog poremećaja konkretnog kinematskog akta, posebna je vrijednost žljebastih tektoglifa u njihovoj osjetljivosti na sve i najmanje morfološke promjene na pravcu njihovog usjecanja. Naime, osim što R-tektonit abradira krila do trenutka dok se ne dezintegrira kao aktivni oblik, njegova aktivnost obično prestaje i u trenutku kad na svom putu naiđe na razinu nižu od razine svog kretanja (kod podinskog krila). Tada rotirajući fragment »upada« u »rupu« i njegova aktivnost prestaje, pa završetak tektoglifa (čelo) ne sadrži nikakve ostatke kataklaziranog fragmenta. Uzrok može biti svako zatečeno udubljenje ili skok na putu kretanja, dublje od promjera normalnog na njegovu os rotacije. U takvom slučaju tektoglif prestaje na liniji pukotine, pa završetkom kretanja, s čelom, označava lineaciju pukotine, a ne b — lineaciju (Sl. 6). Ova osobina omogućava trasiranje, pa i djelomično utvrđivanje karaktera paleopukotine i onda kada se pukotina ne može neposredno terenski opaziti (Sl. 7), jer je nižu razinu podloge moglo prouzrokovati samo relativno spušteno krilo ili podvučeno krilo reversne pukotine.

Na manjoj se površini fragmenti aktiviraju u R-tektonite u isto vrijeme. Ako takva jedna grupa, različitih mjesta polazišta, završava isto-



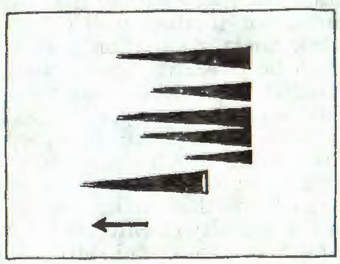
Sl. 6. Prestanak usjecanja R-tektonita na relativno spuštenoj paleopukotini.

Fig. 6. R-tectonites terminate ploughing at a relatively depressed paleojoint.



Sl. 7. Mogućnost određivanja lineare normalne ili reversne paleopukotine.

Fig. 7. The possibility of determining the straight line of a normal or reverse paleojoint.



Sl. 8. Slučaj kada nedostatak kataklaziranog ostatka R-tektonita označava linearu paleopukotine paralelne s b-osi.

Fig. 8. The case when the absence of the cataclastitised remainder of a R-tectonite marks the straight line of a a paleojoint parallel to the b-axis.

dobno svoje kretanje čija odsječena čela tektoglifa označavaju linearu normalnu na njihovo pružanje (na a— lineaciju), to je u prvom redu lineara pružanja paleopukotine, odnosno prestanak stvaranja tektoglifa na granici relativno spuštenog ili podvučenog krila pukotine (Sl. 8). Podudarnost s b — lineacijom je slučajna.

Često je dovoljna i sasvim mala udubina u podlozi da bi prestala rotacija nekog još manjeg R-tektonita. Međutim, i tada u punoj mjeri iskazuje svoju vrijednost (Sl. 2) indikatora slijeda neposredne promjene kinematskog akta — tamo gdje je prestalo usjecanje, tektoglif je naišao na već formirani žlijeb.

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Gutterlike Tectoglyphs

S. Marinčić and D. Matičec

The expression »tectoglyph« is used by S. Dżułińsky and J. Kotlarczyk (1965) as a term already desribed by W. Teisseyre and also, in more recent literature, by J. P. Petit et al. (1983). It seems possible that this term is more acceptable then the customary wide-embracing concept of »stria«, because it describes in a more direct way appearances of mechanical tracings created by the fault walls' displacements, the so called »a-lineation«.

Opposite to the well studied standard tectoglyphs (e. g. Dżuzułińsky and Kotlarczyk, 1965; Petit et al., 1983), identifiable by characteristic ridges, elongated along the fault walls' direction of movement, this text will discuss the morphology and genesis of somewhat scarcer occurence of tectoglyphs marked by channels, i. e. gutters.

Observations were being perfomed in the Upper Jurassic limestones near the town of Rovinj (the Zlatni Rat locality) and i Cretaceous limestones of the Učka Moutain (the Petnički Vrh locality). At both localities mechanical tracings have been induced by an interstadial displacement, so that they are accesible to observation exclusively along the surface of the foot wall (stratum), namely only when the hanging wall had been eroded. Such a situation leaves some room to a dilemma whether this process can at all be perceived in its totality when there is only one half of the information available. Namely, it was necessary to shun the conventional habit to look at this »negative shape« as a consequence of a similar »positive shape«. The basic directions were provided by first descriptions of similar phenomena in the Cretaceous flysch sandstones, denominated by Dżułińsky and Kotlarczyk (1965) »prod marks«.

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The Experiment

To realize a possibility to monitor the mechanizm of physical changes in a step-by-step manner, approximate natural conditions which may have induced a similar effect were simulated. A globule of writing chalk, representing a harder abrasive material, had been positioned between two wax plates and these were by a permanent hand pressure, moved one against the other in a single direction.

The globule either rotated, leaving in the process a prod mark on both the upper and the lower wax plates (Fig. 1, A), or alternatively, when becoming stuck in the upper plate, it was leaving a prod mark along the lower plate only. A mark which is very similar to the one i the nature: a shallow and narrow »tail« at the beginning of the movement, progressing towards a deeper and wider »face«, where the mark quite abruptly terminates at the moment when the remainder of the globule completely ploughs into the wall (or walls) and looses its effective mass, while walls adhere to each other and continue the displacement without this additional resistance (Fig. 1, B). By the continuation of the movement begins the smoothing and erasure of this initial glyph.

It is interesting to note that the final effect of the experiment is not influenced by the essentially limited possibilities to sustain a constant hand pressure — the characteristic morphology of the natural, concave, i. e. gutterlike tectoglyph is regularly well discernible. In time stages it looks as follows: at the start of the movement the globule becomes to be pressed by wax plates by an aditional force, resulting in its shallow ploughing into the walls by its peripheral section. As the displacement progresses, the globule begins to rotate and elongates along its b-axis (R-tectonite!). At the same time, due to the compaction intrease of the rotating material, its abrasive capability also increases, so that the tracing becomes progressively deeper, to terminate abruptly at its deepest part, which makes a good feint of the b-lineation by its cut-off shape and the remaining chalk.

In the case of natural gutterlike tectoglyphs the b-lineation is even stronger marked by the cut-off ends of grooves, which often contain the cataclasticised material of the rotating tool of particles of the hanging wall.

This handy experiment does not enable a direct monitoring of the mechanism of changes in a case when the globule becomes fixed in one of the walls. In such a case the abrasion is probably also modified by the torn-off, rotating particles of the rotating globule, because the tracing is identical and demontrates the same value. although upon a single wall.

The relation between the gutterlike and common tectoglyphs

In places where they appear, gutterlike tectoglyphs are a mass phenomenon. This is quite understandable, because a single fragment would disintegrate, due to the large pressure, before leaving any more notable tracing. Besides, it was noted that these faults are tectonically poorly changed, so that they do not possess »slickenside« features and apparently keep an outlook of normal beeding plannes (Fig. 5, A, B). However, at certain parts of the same fault surface, where there were earlier direct contacts between strata (walls) being displaced, due to natural uneven areas of bedding planes, the tectonisation has progressed to the initial phase of the creation of slickensides. There are no gutterlike tectoglyphs at such places, but instead there is an appearance of the first, less marked ridge tectoglyphs.

It could be said, at least for this area, that the common variety of gutterlike tectoglyphs, shaped like a tobacco-pipe, regularly signals the beginning of a stronger tectonisation. These pipelike shapes are indented as curved trace of a continuous transit of the displacement from the I to the II kinematic phase of the higher-degree tectonisation. The culmination of a pipelike tectoglyph terminates in its face, in the direction where no more gutterlike forms appear — this is the direction of first ridge tectoglyphs (Figs. 2, 3).

It is obvious that gutterlike tectoglyphs are the outcome of initial resistances against the movement which tends to arrange the fabric of a fault out of a single specific established situation. This preliminary tracing can be expected in its entirety just in the case of an interstratal movement. On the one hand, the accentuated physical interface of strata enables caving in of parts of the hanging wall's base and these will function as R-tectonites. Since these limestones are often graded, the base of the hanging wall can contain smaller protubernaces, made by the diagenetic process, and these will easily abrade the top micrite part of the foot wall when the movement begins.

It can be therefore said that gutterlike tectoglyphs are tracings of initial movements, but this however does not mean that they can be automatically equated with tracings originating form the first phase of the observed structure's movement. That they can well be, but not necessarily so, because the restored similar preconditions of the wall's state can, within a certain new kinematic act, create new initial gutterlike tectoglyphs on the same plane.

Just as they are easily met on interstratal displacement planes, due to the nature of their mechanism of origin, these phenomena could also be very rarely found on planes of classical faults, which cut homogeneous strata of the same series. In these cases the fault's location is not predisposed by a physically »weak spot« of the geological body, but rather by the distribution of the dynamic force. The composition, structure and hardness of both walls being identical, there is no preferred wall regarding either of these components. The creation of a slickenside begins by a direct process and tectoglyphs can be formed upon it, but only reciprocal forms on both walls — ridge tectoglyphs (Fig. 5, C).

Gutterlike tectoglyphs could originate on this fault only in a well-advanced phase of tectonisation, when R-tectonites of the new kinematic phase would wedge themselves in the open space between the walls.

On possibilities to assess magnitude of total movement

Due to its impressively indented and closed form, a tectoglyph strongly suggests the total length of the wall's movement. Unfortunately, the length of this mechanical tracing corresponds only to the life-span of an obstacle against the movement, namely to the period between it becoming fit to produce a resistance against the movement of walls and its bodily disintegration.

As in this particular case peritidal carbonate strata of the shelf are, both in their composition and their thickness, practically unchanged for ten kilometers or so, any even a minute change in quality of the interface between strata will find its reflection in results of movement of these huge walls. Namely, while the movement lasts all points within the interface zone will not necessarily have the same conditions. Particular bodies will unavoidably start their ploughing actions at various times and, consequently, cease at various times. Due to this, an evaluation of a limited outcrop (even in the case of a clasical fault) does not allow to conclude with any seriousness about the magnitude of the total movement. Even if the review of the whole wall was known, nothing more affirmative could be said than that walls had not been moved for less than the length of the largest gutterlike tectoglyph.

Gutterlike tectoglyphs as indicators of paleotectonic disturbances

Apart from an easy possibility to establish the relative direction of a fault wall's movement, as well as the degree of the tectonic disturbance of a particular tectonic act, gutterlike tectoglyphs have a distinct value of being sensitive to all, even minutes morphologic changes along the direction of their ploughing. Namely, apart from the fact that the R-tectoglyph abrades walls until the moment it disintegrates as an active shape, its activity usually ends at the moment when it, along its path, meets a level lower than the level of its movement (in the foot wall's case). The rotating fragment »falls down« into »the hole« and its activity terminates; so does the tectoglyph. The cause for this can be any existing concavity or an escarpment along the fragment's route deeper than its diametre normal to its retational axis. In such a case the tectoglyph terminates on the joint line, so that by the termination of the movement its face marks the lineation of the joint, rather than the b-lineation (Fig. 6). This particularity makes possible to trace, or even partially establish, the character of a paleojoint, even when the joint cannot be directly discerned in situ (Fig. 7), because the lower level of the base could have been caused only by the relatively down thrown wall itself or by the underthrust wall of the reverse joint.

On a smaller surface fragments activate themselves into R-tectonites at the same time. If such a group of tectonites, with different starting points, ends its movement simultaneously, with cut-off faces of tectoglyphs marking a straight line normal to their strike (to the »a-lineation«), this is in the first instance the straight line of the paleojoint's strike, namely the termination of the creation of tectoglyphs at the boundary of the relatively depressed or underthrust wall of the joint (Fig. 8). The conformity with the b-lineation is accidental.

Even a quite small concavity in the base is often sufficient to stop the rotation of a certain even smaller tectonite. However, even then is fully demonstrates its value as an indicator of the sequence of a kinematic act's direct change — there where the ploughing action stopped, the tectoglyph met an already formed gutter.

TABLE — PLATES

1. Lulaste forme žljebastih tektoglifa Zlatni Rat (Rovinj).
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2. Lulaste forme žljebastih tektoglifa Zlatni Rat (Rovinj).
   »Tobacco-pipe« shaped gutterlike tectoglyphs Zlatni Rat (Rovinj).
3. Prestanak usjecanja žljebastih tektoglifa na paleopukotini. Zlatni Rat (Rovinj).
   Terminal ploughing of gutterlike tectoglyphs at the paleojoint. Zlatni Rat (Rovinj).
4. Prestanak usjecanja žljebastih tektoglifa na paleopukotini. Zlatni Rat (Rovinj).
   Terminal ploughing of gutterlike tectoglyphs at the paleojoint. Zlatni Rat (Rovinj).
5. Lineara paleopukotine indicirana završetkom usjecanja grupe žljubastih tektoglifa. Zlatni Rat (Rovinj).
   The straight line of the paleojoint indicated by the terminal ploughing of the gutterlike tectoglyph's group. Zlatni Rat (Rovinj).

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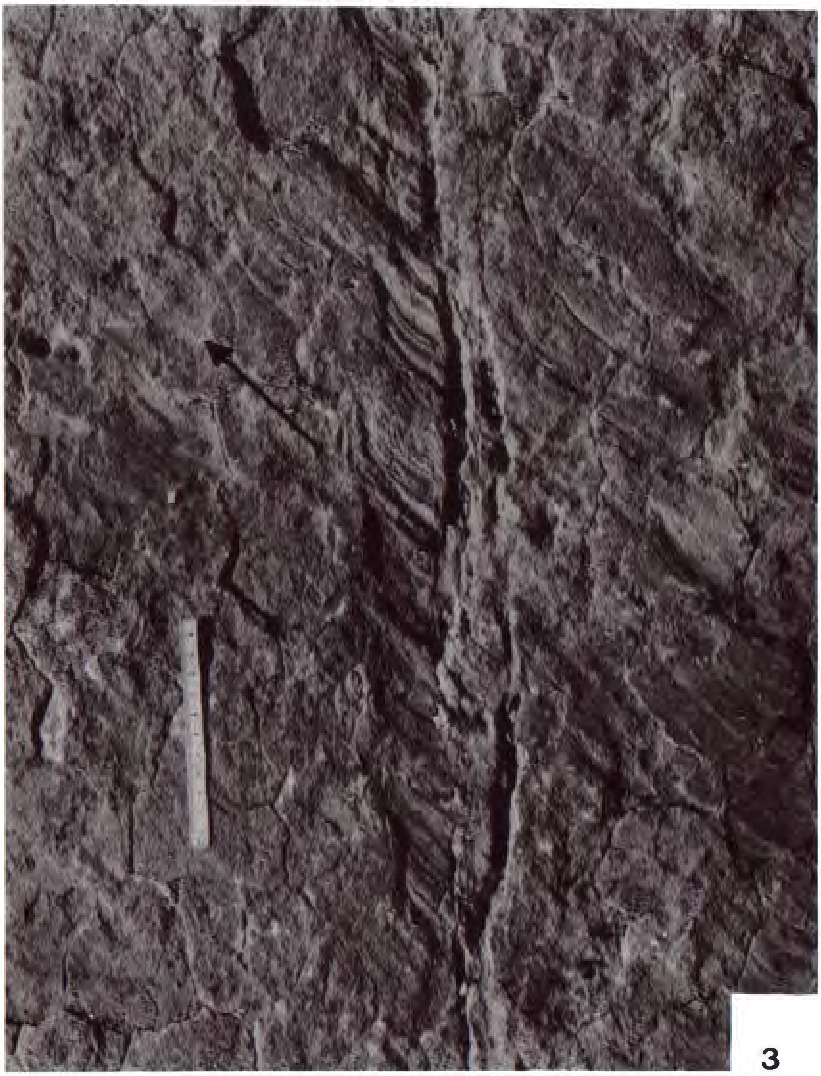

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