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## PARALOGISM IN GEOMORPHOLOGY

There is no doubt about climatic geomorphology to be one of natural sciences. Nevertheless its development is in no way similar to them. The greater part of these sciences has originated in the antiquity already and their evolution has by far not yet been completed. On the other hand geomorphology has resulted from the work of only one generation of scientists. They created its fundamental principles and solved all its problems in the main. Nowadays, their precepts are being only applied to, and there is no problem more which could not be made clear on this basis.

Therefore, geomorphology was not developing as slowly as other sciences, but it arose nearly all of sudden — after the victorious struggle of erosional ideas concerning the river valley genesis against the tectonic conception. This was acknowledged by Hettner (1928, p. 28): „Mit dem Siege der Erosionstheorie ist die Morphologie eine selbständige Disziplin gegenüber der Tektonik geworden.“

With regard to the lack of deep boreholes, of geophysical and geodetic measurements, the erosional as well as tectonic explanations had of course to be entirely or mostly speculative at that time. That is why deduction became the only working method of climatic geomorphology — from the forms of the relief directly their genesis was deduced. On this basis the genetic system of W. M. Davis was elaborated. But Hettner (p. 29) did not agree with this incorrect method and criticized Davis's ideas: „... ihre ganze Deduktion von der Erosion des fließenden Wassers ausgeht; sie rechnen damit als mit einer bekannten, nicht weiter zu untersuchenden Tatsache.“

Onesided erosional deductions cannot be held for a research of nature, in fact, but only for individual ideas trying to elucidate the origin of valleys and of other forms of the relief. Hettner is right if noting that only mistakes arise in this way. Therefore he criticizes the erosion theory sharply: „... sie macht sich die Art des Einschneidens und die Grenze der Erosionsarbeit oft nicht genügend klar und ist dadurch zu falschen Vorstellungen und Schlussfolgerungen gekommen, die sie bei einem Durchdenken leicht hätte vermeiden können.“

In addition to the above-mentioned reproofs he warns against dogmatic use of these incorrect explanations and calls for the deduction method to be complemented with the inductive way of research: „Auch heute enthält die Theorie (der Erosion) noch eine Anzahl zweifelhafter Sätze, vor deren dogmatischen Anwendung man sich hüten muss. Sie muss mehr bisher in jeder einzelnen Ausstellung mit der Wirklichkeit verglichen, durch induktive Betrachtung geprüft werden.“ Moreover he reproves the geomorphologists for their ignoring of this requirement all the time: „Die meisten jüngeren Morphologen widmen sich dieser Arbeit so- licher Grundlegung zu wenig.“

It is evident that there are serious defects and imperfections within the fundamentals of the erosion theory i. e. in the root of all the climatic geomorphology, too. This is understandable, since geomorphology did not virtually originate as a science exploring natural processes, but as a science only publishing considerations about valley genesis. This state lasts practically from the time of the origin of this science. Its working method has not at all changed till now. This is proved even by Carson's and Crickmay's judgment of the scientific level of modern geomorphology. Carson (1971) writes: „Much attention has been given — at a superficial level — to corrasion as a major general mechanism of erosion. Notwithstanding the attention paid to corrasion by geomorphologists, however, very little is known about the mechanics of this process.”

Of course, if research has not at all advanced till our time, then original erosional conceptions still remain unverified. That is why they cannot be held for scientific precepts. They are still only primary ideas which can well be right but more probably are not. Every hypothesis has to be verified — otherwise it remains only an idea and is of no value for science. Crickmay (1974, p. 195) is very well aware of the peculiarity and relevance of today's state of things in geomorphology and he estimates it very critically — he is sure that the requirement to verify precepts would be quite a revolution („this, in itself, is a form of revolution; passive, perhaps, but all the more insidious”).

The lack of verification is thus the fundamental feature of the whole erosional theory. Since it is the question of mere speculations, it is useless trying to argue against them, e. g. by a detailed geomorphological study in river valleys. We find here for the most part nothing which could prove or disprove erosional interpretations. The incorrectness of genetic erosional explanations is to be likely brought to light by an analysis of their form and subject and by their mutual confrontation. Thus we get out of the framework of natural research, but if the incorrectness of erosional presuppositions is to be detected, there is no other way.

In contrast to other sciences, disputations have not in fact been taking place in geomorphology. The only controversy between adherents of erosional interpretations on one hand and adherents of tectonic views on the other hand took place in the past century already. With a common lack of substantial proofs, it must have been only the matter of an exchange of opinions. It was, therefore, the mere ability to argue promptly which gained the victory for the erosional theory.

As early as in the antiquity philosophers pursued from a common point of view the analysis of the incorrect but successful argumentation. That is to say, that already then a successful advocate of a wrong conception unjustifiably gained a reputation of a wise man, of a scientist. This was the way of the sophists disputes. Even experts — after Aristotle — got embarrassed by their arguments. Neither recognizing the grounds of a discussed problem nor convincing the opponent, but gaining a victory at any rate is the question in such an argumentation. The sophists' seemingly conclusive argumentation is, in fact, always fallacious in its form or subject.

Aristotle enumerates 13 kinds of fallacious arguments (paralogism). Some of them are to be found among the genetic precepts of geomorphology, too. Let us start e. g. with the geomorphologic term „erosion”. This term is the point of departure of all other erosional explanations and an example of a multisense word (homonymy). In erosional precepts „erosion” applies either to transport (wearing away), or to disturbing activity (corrasion, abrasion), or to various combinations of more processes — weathering, corrasion, corrosion, denudation, and transport.

In the German geomorphologic literature erosion is not even regarded as a separate process — „Erosion, Transport und Akkumulation . . . doch nicht scharf zu trennende Vorgänge sind, sondern in steter Wechselwirkung stehen“ (Machatschek 1954).

It is sure that a vague i. e. incorrect subject of the basic term „erosion“ must lead to incorrect and little reliable erosional explanations. One of the fundamental erosional theorems — that a river can deepen its valley even in the hardest rocks if having time enough — can serve as an example. In its support it is said that even drops of water can deepen a pit in a hard stone („Der Tropfen höhlt den Stein“, Hettner 1928). This seemingly conclusive argument is, of course, an example of paralogism called „ignoratio elenchi“. One statement is here wilfully changed for another. Surely both these processes cannot be confused — the matter is corrosion and weathering in the case of dropping water, but corrasion and transport in the case of river activity.

After another deep-rooted presumption the mere existence of a valley with a water stream on its bed is held for a proof of the erosional genesis of the valley. This is nothing than another paralogism, called „petitio principii“, i. e. the thing still to be proved is held for entirely proved already. Such an erosional interpretation could be correct only in the case if the valley originated in loose rocks. To give general validity of erosional genesis to all valleys is also an example of the paralogism „fallacia secundum quid“ — what is valid under specific conditions is held here for common.

If we ask the question „what has existed earlier — the valley or the river flowing on its bed“, we get near the paralogism „fallacia consequentis“ which confuses the cause with the consequenc. It is rather difficult to imagine how and where the stream has flown before a valley was formed — especially on the surface of hard rocks. On the other hand it is quite easy to understand that water always gathered (as it is in our time) in the lowest parts of the relief i. e. in depressions and valleys. Therefore the existence of the valley must have been antecedent to the forming of the water streams. A diametrically different opinion is taken for granted by the erosional theory.

The genesis of river terraces can be surely explained in two ways — by erosional or by tectonic activity. Climatic geomorphology rejects the tectonic explanation and holds the erosional genesis for self-evident and proved. Here it is again the question of the above-mentioned paralogism „petitio principii“. To this kind of paralogism probably all other erosional explanations can be ranged — on the inversion of the relief, on the water erosion being more intensive than the glacial erosion, on the erosional origin of submarine canyons, on antecedent and epigenetic cutting down of rivers into hard rocks, on the origin of valleys on the Mars and on the Moon, on the backward erosion, on the cutting down of meanders, etc. As, in fact, none of the erosional interpretations has been proved, all the erosional „theory“ cannot be held for right.

By bringing cases of paralogism in erosional explanations to our attention, we are able to understand better why Peschel's right tectonic interpretations from the past century could be rejected so easily and without research. This reminds us again of the low quality of erosional genetic interpretations which form the basis of modern climatic geomorphology.

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## Résumé

### PARALOGISMY V GEOMORFOLOGII

Je známo, že geomorfologie se nevyvíjela od starověku jako většina ostatních přírodních věd, ale vznikla vlastně naráz — při vítězné konfrontaci erozních názorů s tektonickými. Není vědou, která zkoumá přírodní procesy, ale na základě dedukcí pronáší pouze úvahy o údolní genezi ap. Tento stav trvá dodnes. Erozní výklady zůstávají přitom stále neověřeny, a tak je vlastně nelze považovat za vědecké poučky. Požadavek ověřování těchto výkladů by zřejmě vyvolal úplnou revoluci (Crickmay 1974).

Chybné dedukce se ovšem nedají vyvrátit podrobným geomorfologickým zkoumáním přírody. Protože jde pouze o úvahy, lze jejich nesprávnost odhalit spíše rozbořením formy a obsahu jednotlivých pouček a jejich vzájemnou konfrontací. Tím se zabývali i filozofové starověku. Úspěšný obhájce chybného názoru už tehdy získával neoprávněně pověst moudrého člověka. Tak vedli své spory sofisté. Aristoteles uvádí 13 druhů paralogismů (klamných soudů), které sofisté používali a z nichž některé nalezneme i v geomorfologických výkladech.

Známým paralogismem je víceznačnost slov (homonymie). Jejím příkladem může být hned základní pojem „eroze“. Ta je považována buď jen za transport nebo jen za rušivou činnost nebo za kombinaci více procesů — zvětrávání, koraze, koroze, de nudace a transportu.

Erozní vznik údolí v tvrdých horninách je zase přirovnáván k vyhlubování jamky kapající vodou. Jde tu o paralogismus „ignoratio elenchi“, tj. o vědomou záměnu jednoho procesu za jiný. Nejrozšířenějším je však paralogismus „petitio principii“, kdy je za dokázané považováno to, co je třeba teprve dokázat. Sem patří snad všechny erozní poučky — o erozním vzniku říčních údolí, o inverzi reliéfu, o vzniku podmořských kaňonů, o epigenezi a antecedenci (v tvrdých horninách), o zařezávání meandrů, o větší síle eroze vodní než ledovcové ap. Protože žádné erozní tvrzení není vlastně dokázáno, nemůže být dokázána ani správnost erozní teorie jako celku.