Geology: a science about dynamic signs in dead things

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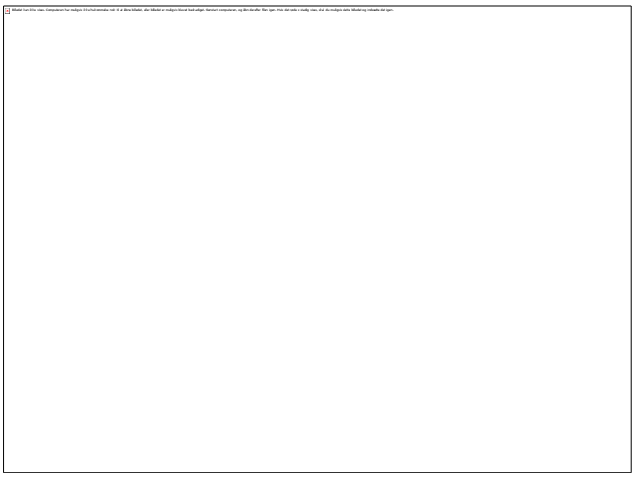

What tells this cliff-section of sand at Læsø????

The mathematical laws of Nature yield absolutely no help and leave us completely lost in mystery. However, elementary logic reasoning on recognized and altered structures tells a lot. There are virtually no coulour- and grainsize differences. Nevertheless, wind and drying of the cliff lets us see structures in a nearly homogenous mass of sand. Thus, structural recognition and geological reasoning tells us that we observe structures from past wave and current action in the sea. Dispite total lack of body-fossils (dissolved) purely structural recognition and geological reasoning also tells that the sea bottom was inhabited by *heart-urchins* (the layers around the knife and at the top of the picture) and a few *lug-worms* (above the cross-bedded layer in the middle).

Science is not only a matter of finding laws that Nature obeys. The forensic methods of natural history are equally important. These methods tell how natural events and developments can be understood stringently, but independently of the 'Laws of Nature'. In particular geology, palaeontology and biology are based on logic methods, which – more or less consciously - are also applied in our reasoning about daily experiences. These important rules of logic reasoning were understood and described in the Renaissance and Enlightenment by the founders of scientific geology, in particular Nicolaus Steno and James Hutton.

When we experience a 'sign' of a past event which is not readable and understandable by, e.g., Newton's mechanical laws, our understanding is not left in a helpless position and given over to pure mystery. Structural relations and structural alteration of things give immediate ways to read and understand what has happened, and what the causes may have been. In contrast to the mathematically founded sciences the natural history-way of understanding leads to possible causal understanding and, thus, to 'meaning'. If for instance you observe a crashed car in ditch, you are not left totally mystified, although Newton's, Maxwell's , Einstein's or Bohr's laws do not yield any help. By immediate forensic reasoning, the 'signs' – such as the kind of deformation, brake marks on the road, blood stains, scratch marks from a car with a different colour etc. etc. - will give you both solid evidence and many stringent hints and leads to what has happened.

Steno was the first scientist to put our basic logic reasoning into a scientific scheme, which soon after became basis of geological reasoning. My intention is to expand this kind of logic with our two basically different fields of observation: 1) The *domainal* field, which is the domain of our sensing, e.g., things as we observe and explain them without forensic reasoning – as in the mathematically founded sciences - and 2) The *extradomainal* field, which is the domain of sense-rational reasoning, e.g., sensing of structural relations and changes of recognized and well-known things followed by our reasoning about these structural relations and changes.

If time permits, I will illustrate the common nature of geological, historical and plain reasoning (as well as religious conflicts with this kind of reasoning) with examples from the poetry of Thomas Kingo, H.A. Brorson, B.S. Ingemann, Johs. V. Jensen, Thøger Larsen, Ole Wivel, and Poul Kjøller.

Further reading: http://2dgf.dk/xpdf/gt2007-27-56.pdf
J. M. Hansen: Hvad adskiller geologi fra anden naturvidenskab og metafysik? Eksempler fra dansk poesi, politik og naturvidenskab. *Geologisk Tidsskrift* ***2007***, 27-56.