

SHORT COMMUNICATIONS

A CONSIDERATION OF THE CONTINUITY OF THE TERTIARY OROGENIC SYSTEMS OF EUROPE AND ASIA¹⁾

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It is considered necessary from the outset to define terms of reference with regard to the analysis of orogenic systems. It is considered that Kober's main complex models, based essentially on the Alps, cannot be usefully applied as a universal pattern, because they involve too many possibly unrelated variables of tectonics: rheology, metamorphism, and chronology. The speaker would seek to differentiate the following aspects of Orogenic Zones.

I. TECTONIC ZONES OR ELEMENTS

In this respect, the "soft rock" and "hard rock" geologists have a different perspective. The former stays on the outside looking in — the latter from the inside looking out. The outer zones are naturally chief interest, and I am sure of the need for greater elaboration in classification.

a) *Foreland*: divided into:

- (i) *Naked effective basement*. In most of North Africa, Arabia, and Foreland India, Pre-Cambrian with approximately N.-S. grain. In the Alps and the Himalayas, the northern effective basement is most commonly Variscan, with smaller fragments of older "basement". What happened to the Variscides in Iran?
- (ii) *Covered effective basement* with inherited structural trends of epeirogenic character, (Algerian Sahara, Libyan Sahara, Sirte Basin, Rhein

Graben, Oman, Saudi Arabia, Kuwait, S. Iraq, and offshore continuation).

b) *Folded zones*

Frequently called autochthonous, but strictly paraautochthonous cover of older basement. Inherited grain frequently expressed in sediment control. New grain late in appearance, (S. Alps of Lugano, etcetera, pre-Zagros Folded Zone, Jura Mountains, Baluchestan). The only wide zones of this category have a basal evaporite lubricating layer, otherwise they could not exist.

c) *Imbricated and thrust fronts*

These have essentially three styles:

- (i) Flat thrusts (Hellenides, Central Himalayas).
- (ii) Gliding tectonics (Alps, N. and S.).
- (iii) Macrodiapiric fronts (Alborz, Pir Panjal).

Tectonic style depends largely on rheology of component rock systems.

d) *Flow style: usually metamorphic folds or nappes*

Probably missing from Iran and Himalayas, but not uniquely from the Alps (present in Rocky Mountains for example).

e) *Median folded zones or kratons*

Sometimes intensely folded, (Iran, Karakorum), often less intensely folded, (Tibet, Transylvanian Basin), sometimes wide Kratons, (Balkan Rhodope, Lut Block, etcetera).

¹⁾ Verslag van de lezing gehouden op 17 december 1970.

The above zones are frequently repeated in mirror images towards the opposing foreland, but with many variations.

II. SEDIMENTATION HISTORY

Sedimentation history in terms of sediment piles, (Tethys, foredeeps, etcetera), and intervening ridges, blocks, etcetera, control tectonic form, but, contrary to Argand's concepts do not have colinearity with tectonic elements, except, approximately, for Tertiary furrows.

III. VOLCANIC ACTIVITY

Volcanic activity was widespread in Trias to Cretaceous, but is most conspicuous in Iran, S. of the Alborz. Syn-tectonic metamorphism is rare outside the Alps, and granites are common except in the Alps.

IV. THE MOUNTAIN SYSTEMS

The mountain systems present a surprising unity in the precise ages of bed rock folding, which decreases in the age outwards, especially southwards. They are also nearly synchronous in the topographic elevation, which, after all, represents the derivation of the word "orogen". Most of the systems have late active (seismic) faults in several different tectonic zones.

V. DYNAMIC FACTS

Many basic dynamic facts concerning the orogenic systems may be deduced, but these are in conflict with current theories based on ocean spreading and plate tectonics.