Žďárky-Pstrążna Dome: Dextral Strike-Slip Fault-Related Structure at the Eastern Termination of the Pořičí-Hronov Fault Zone (Sudetes, Góry Stołowe Mts.)

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Location and geological framework

The precisely mapped area of the Žďárky-Pstrążna vicinity constitutes an integral part of the Intra-Sudetic Synclinorium unit. It is interesting for several reasons. Firstly, because since the 19th century small, though easily accessible coal seams have been excavated and the village of Pstrążna have become a miners’ settlement. Secondly, this area is situated at the border of two prominent structural units – the Kudowa Granitoid Massif
and Kudowa Trough – as well as at the termination of the major dislocation zone – the Poříčí-Hronov Fault Zone (Fig. 1). The mapping field was limited by the following geographical coordinates: the northern border – 50°28’58’’; southern border – 50°27’38’’; western border – 16°14’33’’ and the eastern border – 16°16’33’’. In the Žďárky-Pstrążna area the structural boundaries between the crystalline and sedimentary rocks and between Carboniferous and Cretaceous rocks are of particular significance. In the nearby – in the vicinity of Žďárky – these boundaries have been directly documented in mine drifts and they commonly are of reverse fault type. Alike phenomena, although not precise both in description and interpretation, were identified in the vicinity of Pstrążna, where in one of the drifts (Wilhelminen Schacht) tectonic boundary of Carboniferous had been described, and where reverse stratigraphical sequence had been (probably?) documented (e.g. Flegel 1905, Petrascheck 1904, Weithofer 1897). In places, without any justification, the boundary between the Carboniferous and the Cretaceous was interpreted as an overthrust (Gierwieniec & Radwański 1955), which in consequence became a „basis” for some of the structural models of the Middle Sudetes (Cymerman 2004).

Žďárky-Pstrążna Dome

Two distinct structural elevations are distinguishable in the area of Pstrążna – the Pstrążna Elevation (PE) and the Kudowa Elevation (KE). They are separated by a dislocation zone consisting of numerous normal or reverse faults. A prominent feature of this zone is structural disintegration and common occurrence of structures indicating dextral dislocation with significant horizontal component of the movement. The most characteristic phenomenon is shear slaty cleavage, which so far was often misinterpreted as bedding in sedimentary rocks. The Žďárky - Jakubowice Fault Zone (Ž-JFZ) constitutes the eastern extension of the Poříčí-Hronov dislocation. On the opposite side relative to Ž-JFZ the elevations are assisted by tectonic depressions – the Kudowa Depression (KD) in the west and the Karłow–Batorów Depression (K-BD) in the east. The Pstrążna and Kudowa granite Elevations, despite distinct differences, depict some structural similarity. Their boundaries neighbouring with Ž-JFZ are of fault type and steeply inclined, while the opposite boundaries dip more gently and the sedimentary covers form fault-forced folds. Also the shape outline of both elevations relative Ž-JFZ is

Fig. 1 Location scheme of the Žďárky-Pstrążna area (white rectangle) on the background of main regional structures
similar. Considering the altitude of the basement in the
depressions (from about -100 to 50 m a.s.l. respectively),
relative vertical amplitude of the displacement along Ž-
JFZ exceeds 600 m. Horizontal displacement along Ž-
JFZ is difficult to assess. While the dextral displacement
seems certain, its amplitude is difficult to determine.
Based on the offset of the Carboniferous and the Cretaceous
contacts along the faults trending 310°–130° and
considering possible fold shortening in the elevation ar-
eas, this component can be assessed most certainly as
100 m according to the Carboniferous outcrops.

Palaeogeographic evolution

The morphological uprising (inversion) of the Žďárky-
Pstrčná area had to begin in the Westfalian C and D,
as the Žacler Beds contain redeposited material of meta-
morphobic rock soils (Kraisöfer Gneisskonglomerat, sensu
Dathe & Petrascheck 1913) and the Honron Quartz
Conglomerate (Němejc 1958). In the Stephanian and the
Autunian the rate of denudation increased, which is
indicated by the unconformity surface at the contact with
the Westphalian, poorly sorted deposits and distinctly
lower accumulation potential of the area (relatively low
thickness and numerous erosional surfaces in the depos-
its of the Svatovnice Beds). A new palaeotopographic
pattern concerns the Saxonian deposits, which uncon-
formably overlie both the Carboniferous formations and
the crystalline basement. Deformation of those deposits
are of local character and they relate to the zones of lo-
cal troughs and tectonically formed basins (August &
 Wojewoda 2005). In the Late Cenomanian, during and
after the transgression, the whole area of the Kudowa
Elevation (and perhaps the whole area of the modern
Góry Orlickie Mts. as well), including the Carbonifer-
ous and the Permain, constituted a morphological ele-
vation – probably the denudation relics of the structural
elevation from the time of the Stephanian-Autunian,
partly destroyed between the Saxonian and the Early
Cretaceous (Don & Wojewoda 2005).

Tectonic evolution

Therefore, the name of the „Pstrčná Elevation” refers first
of all to the style of deformation of the Cretaceous for-
mations. And these depict an inclination outwards of the
Carboniferous outcrops, forming, thus, a structural dome –
brachyanticline. This structure had developed in the
post-Cretaceous, and its development only slightly modi-
fied the older structural pattern of monoclinal setting
of the Carboniferous formations (north-western dips of
beds in the western part of the Carboniferous outcrops).
It is not clear when exactly the Pstrčná Elevation had
developed. It is separated by Ž-JFZ to the south from the
Kudowa Depression. The Kudowa Depression is in turn
open to the south, where since the Miocene alluvial sedi-
ments from the eroded Kudowa Elevation have accumu-
lated. And although it can not be straightforwardly proved,
just the Neogene seems to be the period of the tectonic
troughs of Kudowa and Żernov (the Nachod Basin sensu
Wojewoda 2007, this volume) initial development. The
brachyanticlinal pattern of the Pstrčná dome, due to
the lack of cartographical evidence of formerly supposed
“thrusts”, must meet another explanation than a simple
regional compression. Moreover, the author does not find
proofs which could exclude the possibility of comple-
mentary and even synchronous development of the fol-
lowing structures: the Pstrčná Elevation, the Kudowa
Elevation, Karłów-Batorów Depression, the Kudowa
Depression and the Žďarek-Jakubowice Fault Zone.

Their mutual arrangement, their outline and subordinate structural features (faults, shear zones) indicate that they
all could develop as conjugated structures over a regional
strike-slip discontinuity. The features imaged on a struc-
tural model (Fig. 2), as well as those described above in the
paper, allow, in the author’s opinion, to asent the Pstrčná
Elevation and the Žďarek-Jakubowice Fault Zone as fea-
tures originated over and within the strike-slip zone, and
the tectonic depressions of Kudowa and Karłów-Batorów
as a pull-apart basins conjugated with the zone. Ac-

Fig. 2 Structural model of the area of Pstrčná (image at
a level of about 600 m a.s.l.)
1 – 25 m contour intervals of the elevation surface; 2 –
axis of elevation; 3 – central points of the elevations and
depressions; 4 – presumable normal listric faults; 5 – un-
conformities; 6 – fault planes; 7 presumable shear direc-
tions; 8 – presumable extensional zones; PE – Pstrčná
Elevation; KE – Kudowa Elevation; KBD – Karłów-
Batorów Depression; KD – Kudowa Depression; Ž-JFZ
– Žďarek-Jakubowice Fault Zone.
References


