

LITHOLOGY OF GLACIAL SEDIMENTS OF SANIAN-2 (ELSTERIAN-2) STAGE IN TENCZYNEK BASIN, KRAKÓW REGION, SOUTHERN POLAND

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Abstract: The paper deals with the lithology of Quaternary sediments that fill the Tenczynek Basin, Kraków Upland. The basin was eroded within Carboniferous strata before or during the Elsterian. The basin fill can be subdivided into three complexes, the middle one of which records a nearly complete glacial cycle, represented by glacier advance and standstill during the Elsterian-2 (Sanian-2) glacial stage. Sediments of the lower complex were deposited before or during that stage. Following this deposition, a terminoglacial lake was formed and became gradually filled with glaciolacustrine clays and silts that bear a few intercalations of diamictons, some of them shed by slumps. These sediments compose the middle, strongly disturbed complex which, in turn, is unconformably overlain by periglacial sands of the upper complex, deposited during a time-span comprised between the Sanian and Weichselian. The petrographic composition of gravels and cobbles, determined for a wide spectrum of grain-size classes, is highly variable due to differentiated exaration and the changeable supply of extraglacial material.

Abstrakt: Artykuł omawia litologię osadów czwartorzędowych wypełniających Kotlinę Tenczynka na zachód od Krakowa. Kotlina została wyerodowana w skałach karbonu przed lub w trakcie zlodowacenia Sanu-2. Piaski i żwiry dolnego kompleksu osadowego powstały przed zlodowaceniem i w wyniku zatamowania odpływu przez łądólód. Następnie doszło do utworzenia jeziora terminoglacjalnego i sedymentacji osadów glacialimnicznych, z wkładkami diamiktytów o bardzo zmiennym uziarnieniu. Osady te, budujące kompleks środkowy, są silnie zaburzone i przykryte niezgodnie przez peryglacjalne piaski pokrywowe kompleksu górnego, osadzone po zlodowaceniu Sanu. Skład petrograficzny żwirów i głazików w osadach glacialnych, analizowany dla różnych przedziałów frakcyjnych, jest bardzo zmienny z uwagi na zróżnicowanie lokalnej egzaracji i zmiany w dostawie materiału ekstraglacialnego.

Key words: lithology, petrography, Sanian-2 (Elsterian-2) glacial stage, Quaternary, Tenczynek Basin, Southern Poland.

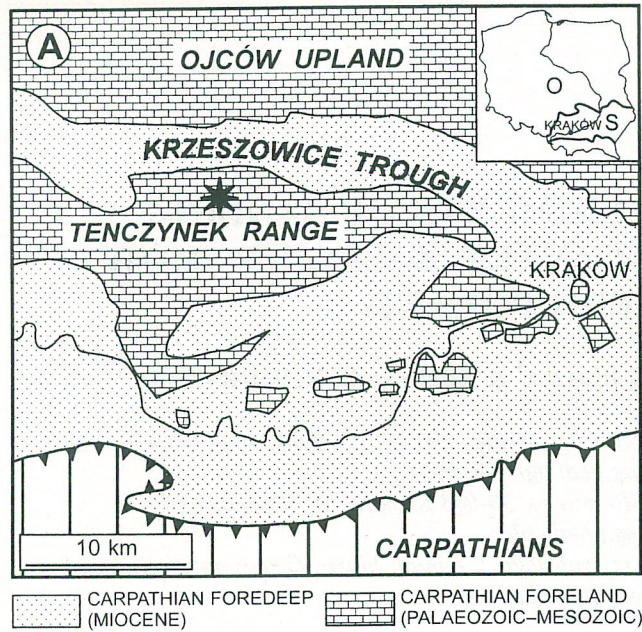
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INTRODUCTION

The paper deals with glacial sediments of Sanian-2 (Elsterian-2) age that crop out in the Tenczynek Basin, Kraków Upland, some 25 km west of Kraków (Figs. 1, 2). These sediments are composed of highly variable series of silts, clays and diamictons, rarely sands and gravels. They are underlain mostly by Carboniferous rocks and overlain by periglacial sands. The Tenczynek Basin provides a rare opportunity in Southern Poland to study a nearly complete sedimentary record of the advance and standstill of the

Sanian-2 icesheet, the most extensive from among Pleistocene icesheets in Poland and the only one which encroached upon this area. This glacial stage is usually correlated with the Elsterian-2 stage of the West European stratigraphic scheme (*cf.* Lindner, 1991; Lindner *et al.*, 1998).

Sediments of the Sanian-2 stage in Southern Poland are preserved only locally due to strong denudation during the subsequent glacial-interglacial stages. Therefore, the Tenczynek Basin, with a nearly 50 m-thick Quaternary infill,



has been chosen as a study area. The only one extensive exposure of glacial sediments and overlying periglacial sands in this area is situated on top of an active quarry of Permian diabases at Niedźwiedzia Góra (*cf.* Figs. 1–4) where Quaternary deposits, a dozen or so metres thick, are accessible in a 250-m-long, southern exploitation wall. It is the most extensive exposure of glacial sediments in Southern Poland which has not yet been described, except preliminary contributions by Rutkowski *et al.* (1993, 1994). From the nearby area, SE of Brodła in the Rybna Depression, tills overlain by aeolian sands have been reported by Dżużyński (1956).

MATERIAL AND METHODS

During field studies individual exposures have been logged (*cf.* Figs. 4–10) and detailed geological mapping of the Tenczynek Basin margins near Liguniowa Góra, Tenczynek, and east of Niedźwiedzia Góra has been made (*cf.* Figs. 2, 3), supplementing the existing 1:50,000 geological

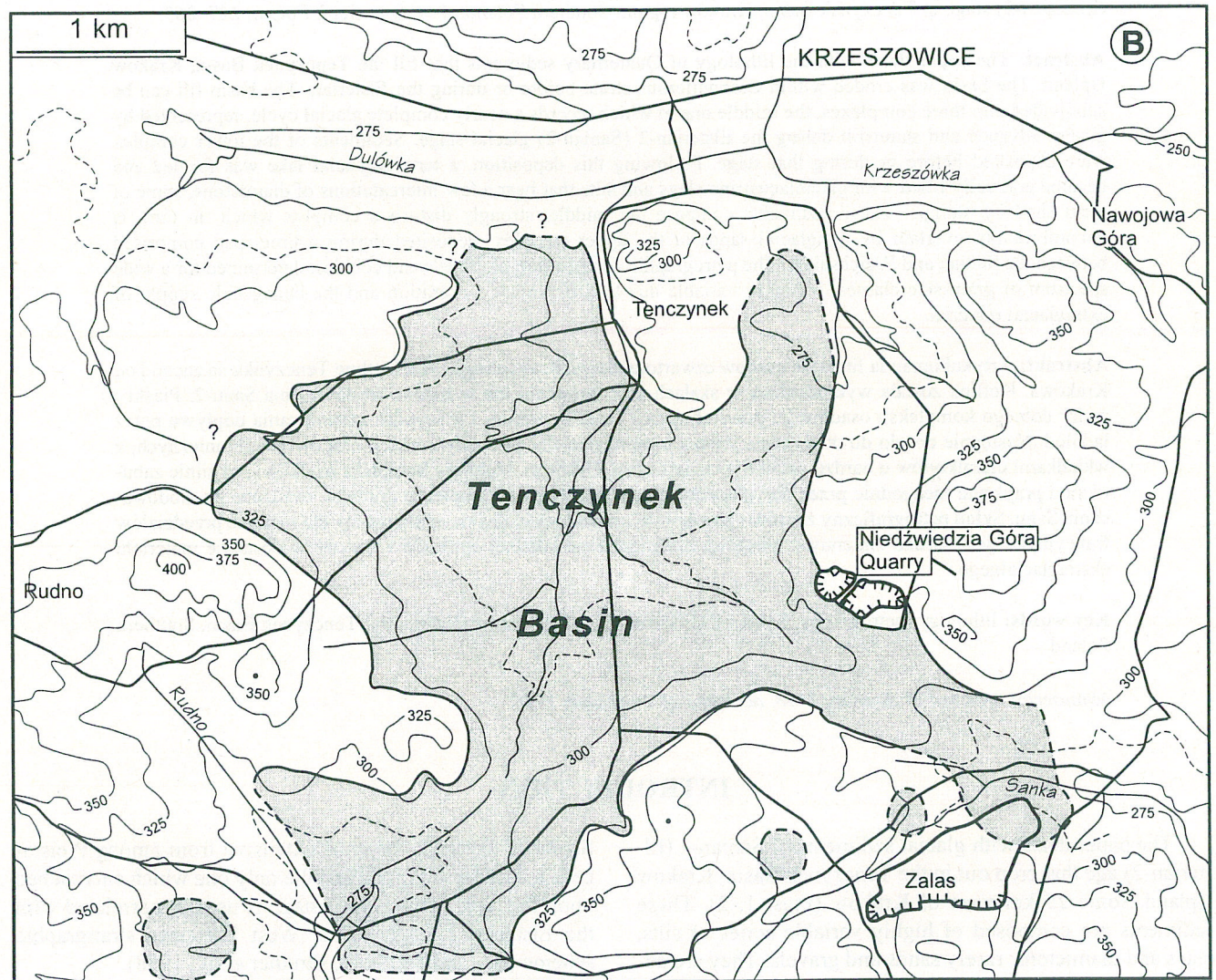


Fig. 1. Tenczynek Basin versus topography of Krzeszowice region, west of Kraków, southern part of the Kraków Upland: **A** – geological sketch, insert cartoon shows the maximum extent of Odranian (Drenthe; O) and Sanian (Elsterian; S) glaciations; location of Niedźwiedzia Góra quarry shown by asterisk; **B** – topographic sketch (hatchure denotes glaciolacustrine sediments)