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CHAPTER II

**EIGHTEENTH-CENTURY TERMINOLOGY OF SCHIEFER
AND GRANITE****Schiefer**

The German term of *Schiefer* raises a critical problem of terminology for translation. It does not discriminate between *shales*, that is, argillaceous sedimentary rocks characterized by thin laminae representing bedding planes, and *schists*, their slightly- to highly metamorphic equivalents. When shales change into schists by the addition of new minerals, they display a new striking planar structure called *schistosity*. These planes generally develop obliquely, at a variable angle to the laminae of the original shales. Transformation of shales into schists may result from moderate tectonic stresses and shallow burial accompanied by slight mineralogical changes (to produce slates, for instance) or from strong tectonism associated with deep burial under high pressures and temperatures and related important mineralogical changes (micaschists, garnet-schists).

Pallas named rocks in the schistose bands which are immediately adjacent on both sides to the axial granites: primitive *Schiefer*. However, he emphasized that those of the eastern band were more metamorphic and more mineralized than those of the western band which he also called *Schiefer*. In reality (see Chapter VI), the western schistose band consists mainly of highly folded Ordovician to Devonian shales, bituminous shales, and sandstones whereas only Cambrian metamorphic schists (phyllites) are weakly metamorphic and lie against vertical Precambrian metamorphics. The eastern schistose band however consists of highly metamorphic schists with intercalated ophiolites and jaspers.

Furthermore, in his description of mountains of third order, Pallas used again the word *Schiefer* in *Sandschiefer* for shales and arenaceous shales of younger geological age.

In this translation, the terms *shales*, for sedimentary, and *schists*, for metamorphic rocks, have been used according to the modern geological context of the Urals to avoid the confusion generated by translating indiscriminately *Schiefer* by schists.

Granite

Pallas' manner of describing rocks called *granite* reveals problems of terminology during the eighteenth century. He knew, and said so in his theory, that the most common composition of granites which form the top or the core of great

mountain chains was quartz, feldspar, and mica. Granites occur, he specified, mostly in large masses. Nevertheless, he observed in the Ural Mountains that the rocks typical of the axial chain consisted of highly inclined beds of feldspar and quartz. He did not use the word granite and in his map of the Urals he described these rocks correctly as *Vitrescirendes Gebürge u. Quarz* (vitreous rocks and quartz). Sometimes in 1776, he changed his mind because he must have read J. G. Wallerius *Systema Mineralogicum...* (1772), the most famous book on mineralogy at that time.

According to Wallerius (1772), granites included various types of rocks:

“SAXA DURA, GRANULARIA, SOLIDA, AD CHALYBEM SCINTILLANTIA, QUAE NON FISSILIA ET VIX IN STRATIS REPERIUNTUR. GRANITAE.”

Spec. 199: “1. SAXUM Quartzo & spato scintillante, in diversa proportione, mixtum. GRANITES SIMPLEX” [namely quartz and shiny feldspar in various proportions; today either a feldspathic quartzite or an aplite or a pegmatite].

Spec. 200: “2. SAXUM, Quartzo & Basaltico lapide, in diversa proportione mixtum, GRANITES BASALTICUS” [the modern aplite or pegmatite with tourmaline].

Spec. 201: “3. SAXUM, Quartzo, Spato scintillante & Mica, in diversa proportione mixtis, compositum. GRANITES...”

“Est compositum Saxum à *Quartzo, Spato scintillante & Mica*, fortius vel debilius, in diversa proportione, coadunatis; à diversitate lapidum componentium diverso gaudens colore; durum, ad chalybem scintillans, polituram suscipiens plus minus perfectam, pro diversitate combinationis particularum; reperitur etenim vel *granulare* vel quasi in *unam massam fusum*; in igne fragile & pulverulentum redditur. Multiplici est differentia, lieat, principaliores solum describere varietates.” [This is the modern description of the composition of granite, that is, quartz, feldspar, and mica, in various proportions, with either a granular or a smooth texture. Wallerius' expression *quasi in unam massam fusum*, however, does not mean “fused together in a fire,” but simply mixed into a mass with a smooth surface. In Latin, the word *ignis* or *calor* would have to be added to refer to the origin of granite by fire.]

H.-B. de Saussure (1779) followed Wallerius (1772) but considered Species 199 rather rare in the Alps, Species 200 very common, and Species 201 actual granite [*granit proprement dit*], that is, that type of granite which is characteristically forming the highest peaks of the Alps.

In the eighteenth century, the term granite was thus not given only to Species 201, most typical for granites, but also to rocks consisting only of two major components (quartz and feldspar) and a variety of other combinations of minerals forming rocks called today granodiorites and diorites. Henceforth, Pallas might have changed the term *Vitrescirendes Gebürge u. Quarz* for rocks forming the axial chain

of the Urals to *Granite* because other famous contemporary German and Swedish naturalists said that the axial chain of high mountains consisted of granite.

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