

layers. Sedimentary rocks occur only in the latter form. Eruptive rocks are totally destitute of fossils and their ages are determined by the relations of contact, which exist between them and sedimentary rocks. Fossils constantly occur in the latter, and constitute the principal means of determining their age. Eruptive rocks resemble in the mode of their formation the slags, which run out of smelting furnaces; sedimentary rocks the slimes deposited in stampworks and allowed to consolidate.

The eruptive formations have been arranged in the order of their antiquity by Naumann as follows :

1. The granulite formation.
2. The granite do.
3. The syenite do.
4. The greenstone do.
5. The porphyry do.
6. The melaphyr do.
7. The trachyte do.
8. The basaltic do.
9. The lava do.

This arrangement is however general and approximative. Not only do the rocks of these formations in their lithological character graduate into each other, but the latter part of one formation may have been erupted simultaneously with the earlier rocks of the succeeding one. Thus trachytes and basalts are almost of contemporaneous origin, and porphyries have been protruded through the earth's crust in the same periods as certain greenstones and melaphyrs. I shall therefore class several of these formations together and refer to them in the following order :

1. Trachyte, Basalt, and Lava. The volcanic formations of Naumann.

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| 2. Phorphyry, greenstone and melaphyr, | } | The plutonic formations of Naumann. |
| 3. Granite, syenite, and granulite, | | |

Trachyte, Basalt, and Lava. I have already adverted to the distribution of volcanoes as constituting a proof of the existence of a molten zone betwixt the central metallic globe and the crust of the earth. I do not deem it necessary to enlarge much upon this point. As Naumann remarks : "Volcanoes exist in every part of the earth, under every latitude, under the equator and near to the poles, in the torrid as well as in the temperate and frigid zones. They are confined to no climate, because in Iceland,