

Fig. 36, as well as the above, is intended to show the relative age of the igneous rocks; Granite, and Syenite are marked as the oldest; next Porphyry and Trap; next the Volcanic. But the supposition on which this order is made out, that all unstratified rocks are melted matter ejected from the interior of the globe, is probably not true. No small part of them are probably metamorphosed stratified rocks, as we shall endeavor to show in our Section on Metamorphism. As to the age of such, it can be determined only when we can fix upon the period of the metamorphism; as we often can with much probability. But mere position will not determine the age.

Origin of the different varieties of Unstratified Rocks.—If the unstratified rocks were all derived from the same melted mass in the earth's interior, we should suppose they would not differ from one another at any period of their eruption. But, in fact, they do so differ as to show, first, that the ingredients from which they were derived were different; and secondly, that the circumstances under which they were formed, as to temperature, fusion, and pressure, were different. The following average analysis of orthoclase granite, greenstone, (feldspar and hornblende), and doleritic lava from Etna, will give an idea of the different chemical composition of the granite and more recent igneous rocks.

	<i>Granite.</i>	<i>Greenstone.</i>	<i>Lava.</i>
Silica,	74.84	54.86	48.83
Alumina,	12.80	15.56	16.15
Potash,	7.48	6.83	0.77
Soda,			3.45
Lime,	0.37	7.29	9.31
Magnesia,	0.99	9.39	4.58
Oxide of Iron,	1.93	4.03	<i>Prot.</i> 10.31
Oxide of Manganese,	0.12	0.11	0.54
Hydrofluoric Acid,	0.21	0.75	

It will be seen that silica was more abundant in the granite than in the later rocks, and that the lime, magnesia and iron, were in much greater quantity in the latter than the former. The consequence is, that the silicates of lime, magnesia and iron, exist largely in the trappean and volcanic rocks, but scarcely at all in the granitic. Now these silicates act as fluxes, and hence the later rocks are much more fusible than the granitic. Indeed, the later are almost infusible, and would require a much higher temperature, or rather a more complete solution, either simply