

Amount of Metals obtained by Mining in 1854.

	Gold.	Silver.	Mer- cury.	Tin.	Copper	Zinc.	Lead.	Iron.
	lbs. Troy.	lbs. Troy.	lbs. Av.	Tons.	Tons.	Tons.	Tons.	Tons.
Russian Empire.....	60.000	58.000	.....	.....	6.500	4.000	800	200.000
Sweden.....	2	8.500	.....	.....	1.500	40	200	150.000
Norway.....	.....	17.000	.....	.....	550	.....	.....	5.000
Great Britain.....	100	70.000	.....	7.000	14.500	1.000	61.000	3.000.000
Belgium.....	.....	.....	.....	.....	.....	16.000	1.000	800.000
Prussia.....	.....	80.000	.....	.....	1.500	33.000	8.000	150.000
Harz.....	6	30.000	.....	.....	150	16	5.000	.....
Saxony.....	.....	60.000	.....	100	50	.....	2.000	7.000
Rest of Germany.....	.....	8.000	.....	.....	.....	.....	1.000	100.000
Austrian Empire.....	5.700	90.000	500.000	50	3.300	1.500	7.000	225.000
Switzerland.....	.....	.....	.....	.....	.....	.....	.....	115.000
France.....	.....	5.000	.....	.....	.....	.....	1.500	600.000
Spain.....	4	125.000	2.500.000	10	500	.....	30.000	40.000
Italy.....	.....	.....	.....	.....	250	.....	500	25.000
Africa.....	4.000	.....	.....	.....	600	.....	.....	.....
S. Asia and E. Indies..	25.000	.....	.....	5.000	3.000	.....	.....	.....
Australia and Oceania.	150.000	8.000	.....	.....	3.500	.....	.....	.....
Chile.....	8.000	250.000	.....	.....	14.000	.....	.....	.....
Bolivia.....	1.200	130.000	.....	.....	.....	.....	.....	.....
Peru.....	1.900	300.000	200.000	.....	.....	.....	.....	.....
Equador, N. Granada, &c	15.000	13.000	.....	.....	.....	.....	.....	.....
Brazil.....	6.000	700	.....	.....	.....	.....	.....	.....
Mexico.....	10.000	1.750.000	.....	.....	.....	.....	.....	.....
Cuba.....	.....	.....	.....	.....	2.000	.....	.....	.....
United States.....	200.000	22.000	1.000.000	.....	3.500	5.000	15.000	1.000.000
Total.....	481.950	2.965.200	4.200.000	13.660	56.900	60.550	138.000	5.819.000

2. ENGINEERING AND ARCHITECTURE.

The spheres of the engineer and the architect are so similar that we may conveniently bring under one head what we have to say of the uses to which they may apply geology. The engineer has to locate railroads, common roads, and canals, to tunnel mountains, to construct embankments, harbors, breakwaters, quays, and bridges. The architect selects the sites of public and private buildings; and both must select materials for their works. Their applications of geology, then, will fall under two heads—1. Location of their works. 2. The materials to be used in construction.

1. *Location.*

In the location of railroads, as well as of carriage roads, an engineer familiar with geology will be able often to prevent great losses and failures by a judicious selection of routes. The greatest danger lies in the loose or imperfectly consolidated materials at the surface. Where there is an alternation of sand, gravel, and clay, especially if the strata are at all inclined, and deep cuts are made through them, slides will be apt to occur subsequently in very wet or very dry weather. He who knows all this beforehand can, by a variety of expedients, guard against such accidents, to which he who has never studied surface geology will be liable.

The same difficulties meet the architect in selecting the site of large buildings. If he can find a little below the surface what is called hard pan, that is, gravel and sand more or less consolidated, he could not obtain a better