

in the various technical branches are carried on. This knowledge presupposes, however, an acquaintance—more or less intimate, according to the nature of the technical branch—with certain other sciences upon which those rules and reasons are based, and in the plan of instruction of an efficient school of mines these sciences are generally all represented. They are—mathematics, physics, mechanics, geology, mineralogy, palæontology, natural history, chemistry, together with instruction in drawing.

As regards the extent to which these sciences are generally entered into, the guiding principle is that the knowledge to be acquired by the student is intended for direct application, not for general scientific accomplishment. On this account, therefore, the entering into any imperfectly-established hypotheses, and into researches aiming at an enlargement of the field of any of the sciences, is precluded; and, whilst those parts of the latter that have no connection, or only a remote one, with the technical branches are left unheeded, or more or less superficially treated, other parts that have a direct bearing upon them receive special attention. Thus, in chemistry, the whole vast field of organic chemistry, and in applied mathematics nautical science, are left quite untouched, whilst astronomy and several parts of physics, viz., acoustics, dioptrics, meteorology, &c., receive only partial notice.

At the Royal School of Mines of Clausthal, Hartz, Germany, and most other German institutions of the same standing, lectures are, for instance, delivered on the following subjects:—

*Mathematics.*—Algebra and analysis to the polynomial theorem, approximate solution of higher equations, geometry, plane and spherical trigonometry, stereometry, analytical geometry.

*Mineralogy.*—General, and a special course in determinative mineralogy.

*Geology.*—Geognosy, dynamical geology, stratigraphy.

*Petrography* includes determination of rocks by means of the microscope.

*Mining Geology.*—Geology and search of mineral deposits.

*Natural History and Palæontology.*

*Inorganic Chemistry.*—General, and a special course in stoichiometry.

*Technical Chemistry,* with special course on salt manufacture.

*Analytical Chemistry.*—Qualitative and quantitative, with laboratory practice.

*Assaying.*

*Scientific Use of the Blowpipe.*—Determinative mineralogy and assaying.

*Metallurgy.*—General, and a special course on the metallurgy of iron.

*Mining,* in all its branches.

*Applied Mechanics,* with special courses on the construction of machines, and on the steam-engine.

*Theoretical Mechanics.*

*Mine-surveying.*—Two courses—I. Theory; II. Practice.

*Physics.*—Special attention is given to statics, hydrostatics, hydrodynamics, thermodynamics, hydraulics; more general to optics, electricity, magnetism, acoustics, &c.

*Architecture.*

*Mining and Civil Law.*

*Keeping Accounts* of mines and smelting works.

*German Language,* as regards style of business letters and reports.

*Free-hand-drawing, Plan-drawing, Machine-drawing.*—Geometrical projection, perspective and isometric drawing.

These lectures are connected with a six months' practical course in the mines, ore-dressing establishments, and smelting works of the Upper Hartz, which every student has to go through in order to be admitted to final examination. The Council of the school grants certificates of Mining Engineer, Metallurgical Engineer, Mining and Metallurgical Engineer, Mining Surveyor, and Assayer, for which students have to pass in the following subjects:—

*Mining Engineer.*—Mathematics, mineralogy, geology, petrography, mining geology, mining, inorganic chemistry, assaying, use of the blowpipe, mine-surveying, mechanics, physics, drawing, and keeping accounts.

*Metallurgical Engineer.*—Mathematics, mineralogy, geology, inorganic chemistry, technical chemistry, analytical chemistry, assaying, use of the blowpipe, metallurgy, mechanics, physics, ore-dressing (last subject of lectures in mining), drawing, and keeping accounts.

*Mining and Metallurgical Engineer.*—In all the subjects so far mentioned.

*Mining Surveyor.*—Mathematics, mine-surveying, geology, mining geology, inorganic chemistry, physics, mineralogy, and drawing.

*Assayer.*—Mathematics, mineralogy, inorganic chemistry, technical chemistry, analytical chemistry, use of the blowpipe, assaying, metallurgy, physics.

The course of study of any of the engineering branches is three years.

At the Royal School of Mines, London, the lecture courses embrace the following subjects:—

*Inorganic Chemistry.*—Theoretical, technical, qualitative and quantitative analysis, with practice in laboratory.

*Mineralogy.*

*Physics,* with practice in laboratory.

*Applied Mechanics.*

*Mining,* inclusive of *Mining Geology.*

*Geology.*—Petrography, geognosy, dynamical geology, stratigraphical geology.

*Metallurgy,* with practice in laboratory.

*Assaying,* with practice in laboratory.

*Natural History,* with practice in laboratory.

*Palæontological Demonstrations.*

*Mechanical Drawing.*

There are three divisions, viz., Mining, Metallurgical, and Geological, and the lecture courses are