

meteoric waters hold in solution, besides nitrogen, oxygen, carbonic acid, ammonia, and nitrous compounds, small quantities of solid matters which were previously suspended in the form of dust in the atmosphere. After falling to the earth, these same waters become still farther impregnated with foreign elements of very variable nature, according to the conditions of the surface on which they fall.

§ 2. Atmospheric waters coming in contact with decaying vegetable matters at the earth's surface, take from them two classes of soluble ingredients, organic and inorganic. The waters of many streams and rivers are colored brown with dissolved organic matter, and yield, when evaporated to dryness, colored residues, which carbonize by heat. This organic substance, in some cases at least, is azotized, and similar, if not identical, in composition and properties with the apocrenic acid of Berzelius. The decaying vegetation, at the same time that it yields a portion of its organic matter in a soluble form, parts with the mineral or cinereal elements which it had removed from the soil during life. The salts of potassium, calcium, and magnesium, the silica and phosphates, which are so essential to the growing plant, are liberated during the process of decay; and hence we find these elements almost wanting in peat and coal. See on this point the analyses by Vohl of peat, peat-moss, and the soluble matters set free during its decay. *Ann. der Chem. und Pharm.*, cix, 185, cited in *Rep. Chim. Appliquée*, i, 289. Also Liebig, analysis of bog-water; *Letters on Modern Agriculture*, p. 44; and in the second part of this paper the analysis of the waters of the Ottawa river.

§ 3. At the same time an important change is effected in the gaseous contents of the atmospheric waters. The oxygen which they hold in solution is absorbed by the decaying organic matter, and replaced by carbonic acid; while any nitrates or nitrites which may be present are by the same means reduced to the state of ammonia (Kuhlmann). By thus losing oxygen, and taking up a readily oxydizable organic matter, these waters become reducing instead of oxydizing media in their farther progress.

§ 4. We have thus far considered the precipitated atmospheric waters as remaining at the earth's surface; but a great portion of them, sooner or later in their course, come upon permeable strata, by which they are absorbed, and in their subterranean circulation undergo important changes. The effect of ordinary argillaceous