in 1869 discovered the cause of failure on the part of former scientists, and from this year dates the new method of treating gases for their liquid state.

By this new fact the secret of obtaining the liquid of all gases was learned and upon it scientists worked until finally in 1877 two reports of success were received simultaneously by the Royal Institute of London. Pictet reported a method of liquefying oxygen which was somewhat long and circuitous, while Gailletet described a method based upon the principle which is now used and by which large quantities of liquid air are secured at a very low cost.

Honor is due an American however for demonstrating that liquid air is a commercial success, yet Dr. Linde a German scientist has the privilege of installing the first plant which shall do service commercially.

Let us ask ourselves what is a solid, a liquid, or a vapor, or why does a substance assume one of these three forms? Why is water once a solid and again a vapor? You say at once because of the difference of temperature. Certainly, and this is the condition which governs the form of any substance or element.

Let us imagine ourselves to inhabit the sun, then what would be the coustituents of our rain? A liquid having a very high boiling point to be sure. Again, suppose the temperature of the atmosphere at—200° C. to be as common and comfortable to us as 60° F.; then what would constitute the dew and the rain? It would be a mixture of oxygen and nitrogen in the same proportion as we find it in the atmosphere. Hence we find that whether a substance is solid, liquid, or vapor its form is dependent upon its temperature; a relative condition only.

Pictet in his method of liquefying oxygen used several liquids as auxiliary means of obtaining a low temperature. First he liquefied sulphur dioxide by means of pressure. Then by boiling this in a partial vacuum he secured a temperature,—111° C., much lower than its critical temperature by means of which he obtained liquid ethylene. He then boiled this liquid ethylene in a partial vacuum in the same manner as he did the liquid of sulphur dioxide thus securing, again, a fall of temperature which reached 119° C. He thus secured a sufficiently low temperature to liquefy the oxygen.

The method as improved by Dr. Linde of Munich and the