## The Alkaloids of Coffee

In addition to caffeine, the main alkaloid of coffee, trigonellin—the methyl betaine of nicotinic acid—sometimes known as caffeine, has been isolated from coffee. This alkaloid, having the formula C14H16O4N2, is also found in fenugreek, *Trigonella fœnum-græcum*, in various leguminous plants, and in the seeds of strophanthus. When pure it forms colorless needles melting at 140° C., and, as with all alkaloids, gives a weak basic reaction. It is very soluble in water, slightly soluble in alcohol, and only very slightly soluble in [p. 160] ether, chloroform or benzoyl, so that it does not contaminate the caffeine in the determination of the latter. Its effects on the body have not been studied, but they are probably not very great, as Polstorff obtained only 0.23 percent from the coffee which he examined.

Caffeine, thein, trimethylxanthin, or C5H(CH3)3N4O2, in addition to being in the coffee bean is also found in guarana leaves, the kola nut, maté, or Paraguay tea, and, in small quantities, in cocoa. It is also found in other parts of these plants besides those commonly used for food purposes.

A neat test for detecting the presence of caffeine is that of A. Viehoever, in which the caffeine is sublimed directly from the plant tissue in a special apparatus. The presence of caffeine in the sublimate is verified by observing its melting point, determined on a special heating stage used in connection with a microscope.

The chief commercial source of this alkaloid is waste and damaged tea, from which it is prepared by extraction with boiling water, the tannin precipitated from the solution with litharge, and the solution then concentrated to crystallize out the caffeine. It is further purified by sublimation or recrystallization from water. Coffee chaff and roaster-flue dust have been proposed as sources for medicinal caffeine, but the extraction of the alkaloid from the former has not proven to be a commercial success. Several manufacturers of pharmaceuticals are now extracting caffeine from roaster-flue dust, probably by an adaptation of the Faunce process. The recovery of caffeine from roaster-flue gases may be facilitated and increased by the use of a condenser such as proposed Ewé.