side, has been demonstrated¹². Production of ootheca, however, is a very specialized process, and its biochemistry may be different from the general picture of cuticle sclerotization outlined here.

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Investigation of Phenolic Components of Brewing Materials by Gel Filtration

POLYPHENOLS, especially anthocyanogens, are of interest in brewing because of their tendency to form insoluble complexes with protein. These phenols are somewhat labile and difficult to isolate completely from colouring matter and low-molecular-weight contaminants. Separation can be achieved efficiently on 'Sephadex' and no reagents damaging to the phenols need be used.

A 2.5 × 30 cm. column of medium grade G.50 'Sephadex' was used. Before packing, the gel was allowed to swell in the eluting medium for several hours. The column was loaded with a 1-ml. sample and elution was carried out with water or 0.001 M phosphate buffer, pH 6.7. The eluate from the column was fed into an auto-analyser assembly where it was mixed continuously with diazotized *p*-amino benzoic acid. Any phenolic material gave coloured compounds, the absorption of which was measured at 420 mμ and continuously recorded.

Fig. 1 shows a typical elution curve obtained using a 1 ml. sample of unhopped brewery wort. The first peak ($K_D = 0$) contains about 30 per cent of the total nitrogen and consists of the high-molecular-weight material (> 8,000), which is mainly protein and melanin pigments. Low-molecular-weight simple phenols (for example, tyrosine) together with sugars and amino-acids are then eluted and, finally, a second peak of yellow material which is actually weakly

Fig. 1. Chromatography of unhopped brewery wort on a G.50 'Sephadex' column. Elution with 0.001 M phosphate buffer, pH 6.7. Material with $K_D = 0$ is excluded from the gel grain (mol. wt. > 8,000). $K_D > 1$ indicates adsorption on the 'Sephadex'.

adsorbed on the 'Sephadex' ($K_D > 1$). This fraction contains all the materials which yield red pigments on heating with hydrochloric acid (anthocyanogens). About 30 per cent of the total nitrogen is also present in this fraction, possibly as preformed soluble protein-polyphenol complex.

Nylon and polyvinyl pyrrolidone are known to improve shelf life of beer by adsorbing polyphenolic materials. 'Sephadex' columns are being used to investigate the nature of the polyphenols and their reaction with proteins, and to study similar compounds which occur in barley and hops.

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PHYSIOLOGY

Climatic Variations of Plasma Potassium in Men

PLASMA potassium has been determined in South Indian and European subjects residing permanently in Madras, and in Europeans in Liège—all male, adult and healthy. The samples of blood were taken from the vein in the morning before breakfast and immediately centrifuged. The potassium was determined in the plasma by flame photometry. The meteorological data were obtained from the Regional Meteorological Center, Madras, and the Institut Royal Météorologique, Uccle, Belgium.

The plasma potassium of one European subject (J. G. H.) was repeatedly determined during several trips in India and Europe during June 1959–April 1961. The 24-hr. average temperature of each experimental day is plotted in the upper graph (Fig. 1).

The other subjects were tested only once, either during summer 1959 in India (9 White Europeans or Americans and 22 Indians), during winter 1960 in Europe (23 Europeans), during July–August 1960 in India (7 Europeans, 27 Indians), in September (24 Indians), during the monsoon (29 Indians), during December, January or May in India (respectively 17, 26 and 30 Indian subjects). The average potassium values and the standard errors ($m \pm s.e.$) are indicated for each group. The lower graph shows the mean temperature per month or half-month (Fig. 1).

No racial differences between Western and Indian men can be observed. On the contrary, climatic

Fig. 1