would seem more likely that the enzyme catalyzes the aldol condensation at *A*, and that the ketimine condensation then occurs spontaneously at *B*. It may be well to defer naming the enzyme until the specificity of its action has been better defined.

Summary. An enzyme has been found in extracts of chicken erythrocytes which converts δ-amino levulinic acid to the monopyrrole porphobilinogen. Some of its properties have been described (*6*).

S. GRANICK

Rockefeller Institute for Medical Research, New York 21

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Natural Antioxidants of *Hevea* Latex

Several attempts have been made to identify the constituents of *Hevea* latex responsible for the resistance of raw rubber to oxidation. The most recent of these was that of R. F. A. Altman (*1*) who gives references to earlier work.

No single compound has been clearly shown to be an antioxidant. Altman and others have concluded that protein fragments give some protection against oxidation. Altman, however, found the highest antioxidant activity in an unidentified water-soluble fraction containing no nitrogen.

It is well known that the antioxidant remains in the aqueous phase in ammonia-preserved latex and can be removed by repeated dilution and reconcentration of the latex. The recent observation by M. W. Rider that the antioxidant activity can be removed from latex by a strong base exchange resin (*2*) suggests that the water-soluble fraction obtained by Altman contains an acid (or acids). This suggestion was tested by determining the effect of crude fractions from the serum of a commercial latex on air oxidation, when they were added separately to a sample of the latex that had been treated with strong base exchange resin (*3*).

Latex, stabilized with Antarox D100 (the resin removes soap), was diluted to 20 percent total solids and divided into three portions. One was reserved as a control. The second was passed twice over a column of freshly regenerated strong base resin (Dowex 2), removing serum acids and amino acids. Rubber-free serum was obtained from the third by creaming with 0.15 percent Superloid (ammonium alginate).

Table 1. Viscosities after 17 hr at 110°C.

Rubber from	"Gel" (%)	Intrinsic viscosity
Untreated latex	10	3.21
Dowex treated (A)	4	1.44
A + acid fraction	13	2.75
A + amino-acid fraction	21	2.54
(Unoxidized rubber	7	5.00)

Protein was removed from this serum by adjusting to *p*H 4 with a strong acid resin (Dowex 50) and filtering. Amino acids were collected on a column of Dowex 50, other acids on a weak base resin (Amberlite 1R45).

The 5 percent ammonia eluates from the columns were added to separate portions of the resin-treated latex to give the same concentration originally present. Oxidation resistance of each mixture was determined by spreading 10 ml of the latex in a petri dish, heating in a circulating air oven at 110°C, and measuring intrinsic viscosity of the rubber in chloroform. The results are shown in Table 1.

Strong antioxidant activity is associated with the acid fraction. This has been shown to consist largely of plant acids (*2*). C. E. Rhines (*4*) has presented good evidence that the ease of oxidation of raw crude rubber from which natural antioxidants are removed depends on transition elements, always present in small amounts. Their effect on oxidation is strongly inhibited by the powerful chelating agent, ethylene bis (iminodiacetic) acid. Plant acids apparently have the same function, although they are less efficient. This may explain an earlier observation (*5*) that the rate of oxidation of ammonia-preserved latex decreases with age of the latex. Fresh latex contains little free acid. Hydrolysis of the esters present causes it to appear slowly on storage.

E. M. BEVILACQUA

General Laboratories, United States Rubber Co., Passaic, New Jersey

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