We are grateful to Dr. G. L. Ada for a gift of neuraminidase and helpful suggestions.

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[1] Lowy, P. H., Keighley, G., Borsook, H., and Graybiel, A., *Nature*, **181**, 1802 (1958).
[2] Lowy, P. H., Keighley, G., and Borsook, H., *Proc. Soc. Exp. Biol. Med.*, **99**, 668 (1958).
[3] Lowy, P. H., Keighley, G., Borsook, H., and Graybiel, A., *Blood*, **14**, 262 (1959).
[4] Rambach, W. A., Alt, H. L., and Cooper, J. A. D., *Blood*, **12**, 1101 (1957).
[5] Slaunwhite, jun., W. R., Mirand, A. E., and Prentice, T. C., *Proc. Soc. Exp. Biol. Med.*, **96**, 616 (1957).
[6] Rambach, W. A., Shaw, R. A., Cooper, J. A. D., and Alt, H. L., *Proc. Soc. Exp. Biol. Med.*, **99**, 482 (1958).
[7] Boström, H., Roden, L., and Yamashina, I., *J. Biol. Chem.*, **230**, 381 (1958).
[8] Ada, G. L., and French, E. L., *Nature*, **183**, 1740 (1959).
[9] Garcia, J. F., and Van Dyke, D. C., *J. App. Physiol.*, **14**, 233 (1959).
[10] Rambach, W. A., Cooper, J. A. D., and Alt, H. L., *Proc. Soc. Exp. Biol. Med.*, **98**, 602 (1958).
[11] Campbell, B. J., Schlueter, R. J., White, W. F., and Weber, G. F., Abstracts 66 C., 136th meeting Amer. Chem Soc., Atlantic City (1959).
[12] Goldwasser, E., and White, W. F., *Fed. Proc.*, **18**, 236 (1959).
[13] Fraenkel-Conrat, J., and Fraenkel-Conrat, H., *Biochim. Biophys. Acta*, **5**, 89 (1950).
[14] Fraenkel-Conrat, H., Bean, R. S., and Lineweaver, H., *J. Biol. Chem.*, **177**, 385 (1949).
[15] Fraenkel-Conrat, H., and Olcott, H. S., *J. Amer. Chem. Soc.*, **70**, 2673 (1948).
[16] Bello, J., *Biochim. Biophys. Acta*, **20**, 426 (1956).
[17] Svennerholm, L., *Biochim. Biophys. Acta*, **24**, 604 (1957).
[18] Fried, W., Plzak, L. F., Jacobson, L. O., and Goldwasser, E., *Proc. Soc. Exp. Biol. Med.*, **94**, 237 (1957).

Co-factors in *Hevea brasiliensis* Latex Serum

IT has recently been shown[1] that the incorporation of mevalonic acid into rubber by an enzyme system in *Hevea* latex *in vitro* is not dependent on the addition of such co-factors as are known to be necessary for the incorporation of mevalonic acid into squalene. Such co-factors include adenosine triphosphate, cysteine and/or glutathione in the case of cell-free preparation of rat liver[2], although Amdur, Rilling and Bloch[3] found that whereas adenosine triphosphate was necessary with a soluble extract of bakers' yeast, no reducing agent requirement was demonstrated. Popjak and Gore show that under anaerobic conditions the reducing agent is not necessary but it is essential for the formation of squalene aerobically. Tchen[4] has demonstrated that the purified enzyme 'mevalonic acid-kinase' responsible for part of the pathway, namely, the phosphorylation of mevalonic acid, requires the presence of any of the four nucleoside triphosphates (including cytidine triphosphate). He shows also that the enzyme is inhibited by chloromercuribenzoate.

The present communication is to record the detection and assay of di- and tri-phosphates of adenosine and cytidine and of cysteine and reduced glutathione in samples of freeze-dried fresh latex sera obtained from Malaya. This material[5] would be expected to be equivalent to the serum from fresh latex 1–2 hr. after tapping, so far as soluble co-enzyme content is concerned. Details of these investigations will be published elsewhere; but it is thought of interest to record that such samples of normal latex sera examined contain approximately 0·7 micromole of glutathione and 0·4 micromole of cysteine per ml. and at least 0·0005 per cent nucleoside diphosphate in the form of adenosine diphosphate and cytidine diphosphate (predominantly as adenosine diphosphate), and almost the same amount of nucleoside triphosphate (predominantly as cytidine triphosphate).

It would be of interest to determine the influence of —SH inactivating agents on both the aerobic and anaerobic incubation of mevalonic acid labelled with carbon-14 in fresh latex to establish the similarity or otherwise of the general reductive mechanism in the two instances.

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[1] Park, C., and Bonner, J., *J. Biol. Chem.*, **233**, 340 (1958).
[2] Popjak, G., Gosselin, L., and Gore, I. Y., *Biochem. J.*, **70**, 15*p* (1958).
[3] Amdur, B. G., Rilling, H., and Bloch, K., *J. Amer. Chem. Soc.*, **79**, 2647 (1957).
[4] Tchen, T. T., *J. Biol. Chem.*, **233**, 1100 (1958).
[5] McMullen, A. I., *Biochem. J.*, **72**, 545 (1959).

Isolation of the Neurotoxic Component of the Venom of the Sea Snake, *Enhydrina schistosa*

THE sea snake, *Enhydrina schistosa*, is widely distributed in the coastal regions of the Far East and many fatalities from its bite are reported[1]. The *LD*50 of the venom for a wide variety of laboratory mammals is in the region of 50–100 μgm./kgm. body-weight. On this basis it is four times as toxic as the venom of cobra. Venom yields per bite of up to 55 mgm. of dried venom have been obtained from captive snakes. If humans are of equal susceptibility to laboratory animals, up to 15 *LD*50 for humans may be expected from one bite. At present there is no supply of antivenom available for treatment, and it is doubtful if the titres obtainable by even the best available preparative methods would be sufficient to allow the antivenom being administered in a life-saving dose. The separation of the neurotoxic component of this venom is important from the point of view of analysing its biochemical actions and enhancing its antigenic properties.

Carey and Wright[2] have shown that the whole venom consists of at least three antigenic components. The neurotoxic component is the most electropositive (*p*H 6·8 in agar gel) and will pass through a cellulose but not a nylon dialysis sac.

In the present investigation it has been found that after repeating the cellulose sac dialysis against large volumes of distilled water approximately 1 per cent of the initial toxicity remains inside the sac. This may be due to a different toxic component or to adsorption of traces of dialysable component on to non-dialysable material. However, it is unlikely to contribute significantly to the toxicity of the whole venom. Immunoelectrophoresis of the cellulose sac dialysate using antiserum to the whole venom shows only one main precipitation line. However, this has since been shown to consist of at least two antigenic components by varying the relative concentrations of venom and antiserum in the immunoelectrophoresis. When the dialysate was placed on a carboxy methyl cellulose column and eluted with *p*H 6·6 buffers of graded molarities from 0·06 to