Habituation and extinction, and possibly sleep, belong to the same category of phenomena, those of "internal inhibition." This is a process opposed by reinforcement, for it tends not to appear in its presence (Pavlov, 1960). This might explain the fact that in our rats a conditioned response was unaffected by pyrogallol during the reinforcement stage, whereas pyrogallol clearly enhanced internal inhibitory processes in situations where reinforcement was absent, like habituation, or extinction.

The decreased rate of establishment of a conditioned reflex, in view of the results on habituation, may be due to the fact that the "inhibitory property" of the conditioned stimulus (Konorski, 1948) was increased by pyrogallol.

In no experiment did our rats show any motor disturbance nor any apparent neurological symptom. The response to shock itself was obviously unmodified by pyrogallol.

Our data on enhanced internal inhibition by pyrogallol, if in fact due to the increase in cerebral catecholamines, may be in agreement with those that ascribe a "central inhibitory," sleep-inducing property to centrally active catecholamines (Bass, 1914; Domer and Feldberg, 1960). Attention is obviously drawn towards those diencephalic and mesencephalic structures which are normally rich in these transmitters (Vogt, 1954).

IVAN IZQUIERDO*
ALICIA B. MERLO

Catedra de Farmacologia Experimental,
Facultad de Farmacia y Bioquimica,
Junin 956. Buenos-Aires. Argentina.
December 6, 1962

REFERENCES

Bass, A. (1914). *Z. ges. Neurol. Psychiat.*, **26**, 600–602.
Domer, F. R. and Feldberg, W. (1960). *Ciba Symp. on Adrenergic Mechanisms.* Editors: Vane, J. R., Wolstenholme, G. E. W., O'Connor, M, Boston: Little, Brown & Co.
Izquierdo, I. (1962). Doctor's Thesis. University of Buenos-Aires.
Izquierdo, I. and Izquierdo, J. A. (1961). *J. Pharm. Pharmacol.*, **13**, 743–746.
Izquierdo, J. A. and Biscardi, A. (1961). *Rev. Soc. argent. Biol.* (in press).
Konorski, J. (1948). *Conditioned Reflexes and Neuron Organization.* Cambridge: Univ. Press.
Pavlov, I. P. (1960). *Conditioned Reflexes.* Dover, New York.
Vogt, M. (1954). *J. Physiol. (Lond.)*, **123**, 451–481.

* Present address: Dept. Anatomy, U.C.L.A. Med. Center, Los Angeles 24, Calif., U.S.A.

Lecithin-cholesterol Sols

SIR,—Further studies have been made of the clear lecithin-cholesterol sols formed by ultrasonic irradiation of coarse dispersions (Saunders, Perrin and Gammack, 1962). Electron micrographs of the residues obtained when the sols are dried down with sodium phosphotungstate as a negative stain, indicate that the lecithin sols alone give round particles many of which have a mean diameter in the range 100 to 200 Å, while the lecithin-cholesterol sols show many membrane-like structures of thickness 40 to 50 Å. A 1 : 1 molar ratio is the maximum cholesterol : lecithin ratio which gives stable dispersions.

The formation of interfacial membranes from concentrated lecithin-cholesterol sols has been examined. Since a cell membrane is probably formed by a precipitation reaction between the cell contents containing a high concentration of lipid and the environmental fluid, a film precipitated at an interface between a lecithin-cholesterol sol and another aqueous solution should give a realistic model of a natural membrane.

The clear lecithin-cholesterol sols are not easily precipitated, but on mixing with a bovine plasma albumin sol they give a flocculent precipitate of lipoprotein; the rate of flocculation is increased by the presence of calcium salts. The possibility of forming this insoluble complex as a film between the lipid sol and an albumin sol has been examined. The lipid sol (10 per cent lecithin, 5 per cent cholesterol) was placed above the albumin sol (10 per cent albumin) to give a sharp boundary. If the albumin sol contained calcium chloride (0·001—0·01N) a membrane possessing considerable elasticity developed at the interface after about 3 hr. The rate of formation of the membrane could be increased by adding calcium chloride to the lipid sol; 0·01 N calcium chloride did not cause any increase in the turbidity of the sol.

A capillary diffusion apparatus similar to that described by Saunders (1960) has been used to attempt to determine the permeability of this interfacial film to salts. Albumin and lecithin-cholesterol sols were treated with mixed ion-exchange resins until their electrical conductivities were negligible. Calcium chloride solution was then added to both sols to give them equal conductivities the final concentration of this salt in each sol being about 0·01 N. In addition, sodium or potassium chloride was added to the albumin sol only, to give a concentration of 0·01 N. Thus the standard system at 24° was:

10 per cent albumin + 0·01 N NaCl (or KCl) and $CaCl_2$	10 per cent lecithin + 5 per cent cholesterol + 0·01 N $CaCl_2$

An interface between the two sols was formed in the capillary 3 mm. above the conductivity electrodes and the rate of diffusion of NaCl or KCl was followed by the conductivity change. With more concentrated sols very low diffusion rates were found, the rate of diffusion of KCl being significantly greater than that of NaCl. Some results are shown below.

D is the diffusion coefficient in $cm.^2\ sec.^{-1}$.

(1) NaCl, $D = 2 \times 10^{-7}$; D into water 150×10^{-7}.

(2) KCl, $D = 15 \times 10^{-7}$; D into water 165×10^{-7}.

(3) NaCl, no $CaCl_2$ in the system, $D = 41 \times 10^{-7}$.

(4) NaCl, 2 per cent lysolecithin in lipid sol, $D = 15 \times 10^{-7}$.

(5) NaCl, colloid components at half concentrations of standard, $D = 40 \times 10^{-7}$.

In experiments (3), (4) and (5) no clear interfacial films were formed.

Acknowledgments are made to A. D. Bangham and R. Horne for the electron micrographs and to D. Russell for his help in preparing the sols.

School of Pharmacy,
University of London,
29–39 Brunswick Square,
London, W.C.1.

L. SAUNDERS

January 1, 1963

REFERENCES

Saunders, L. (1960). *J. Pharm. Pharmacol.*, **12**, 253*T*-256*T*.
Saunders, L., Perrin, J. and Gammack, D. (1962.) *Ibid.*, **14**, 567-572.