the endotoxin. For example, the decrease with endotoxin alone was 50% but with endotoxin and each of the two agents the values were reduced almost to zero (minimum reduction was 90%). In rats made resistant to endotoxin, there was only a 50% decrease in the fibrinogen level using Phlogodym.

Thus, Phlogodym renders rats more sensitive to traumatic shock. The blood fibrinogen level falls dramatically, probably due to the promotion of intracapillary thrombi formation. As Phlogodym is an anticoagulant and an agent decreasing capillary permeability other factors are also involved.

As endotoxin enhances coagulation and reduces the fibrinogen (McKay, Shapiro & Shanberge, 1958), Phlogodym may exert a similar effect in both traumatic and endotoxin shock, thereby aggravating both the reactions.

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Some effects of propranolol on the central nervous system

SIR,—Propranolol, 1-isopropylamino-3-(1-naphthyloxy)-2-propanol, has been described by Black, Crowther, Shanks, Smith & Dornhurst (1964) as a potent β-adrenergic blocking agent. We wish to report the results of some experiments which show that propranolol has sedative and anti-convulsant properties (Table 1).

TABLE 1. DOSES AND ROUTES OF ADMINISTRATION FOR EACH OF THE EFFECTS MEASURED. THE VALUES QUOTED ARE THE MEANS AND 95% CONFIDENCE LIMITS FROM GROUPS OF 10 ANIMALS

Test	Species	Route	Dose mg/kg
Toxicity	mouse	i.v.	LD50 = 38·0 (26·0–55·5)*
	,,	s.c.	LD50 = 244 (224–289)*
Potentiation of narcosis	,,	,,	ED_{min} = 10**
,, ,,	rat	,,	ED_{min} = 25†
Ataxia	mouse	,,	ED50 = 17·4 (12·9–23·3)*
Muscular hypotonus	,,	,,	ED_{min} = 20‡
Partial blocking of electroshock	,,	,,	ED50 = 6·0 (4·55–7·93)*
,, ,, ,,	rat	,,	ED50 = 4·9 (3·20–8·96)*
Complete inhibition of electroshock	mouse	,,	ED50 = 14·4 (11·8–17·6)*
Antagonism of nicotine toxicity	,,	,,	ED50 = 10·0 (6·72–15·1)*
Antagonism of strychnine toxicity	,,	,,	ED50 = 38·5 (22·8–65·0)*
Antagonism of amphetamine grouped toxicity	,,	,,	ED_{min} = 5

*Results calculated from experimental data by the method of Litchfield & Wilcoxon (1949); **$P < 0·02$; † $P < 0·001$; ‡ $P < 0·05$.

Narcosis was induced in mice by propranolol in a dose of 100 mg/kg, or more, administered subcutaneously. The duration of sleeping time in rats or

mice after intravenous hexobarbitone was measured with or without pretreatment with propranolol. The sleeping times of 180 ± 58 sec in mice induced by 40 mg/kg hexobarbitone sodium and 393 ± 219 sec in rats due to 30 mg/kg of the same hypnotic were significantly prolonged (Student's "*t*" test) by propranolol given subcutaneously 30 min before the barbiturate.

Ataxia was measured by the inability of mice to remain on a rotating rod (9 revolutions/min) for a 2 min test period. The maximum effect was reached 30 min after the subcutaneous injection of propranolol and this effect began to decrease after 60 min. These findings may be related to the muscular hypotonia measured by Fleury's technique (1957). 30 min after the subcutaneous injection of 20 mg/kg propranolol, the maximum weight that mice were able to support was reduced from the control level of 52 g to 38 g (a 27% reduction; $P < 0{\cdot}05$). This effect also diminished with time.

Anticonvulsant properties were investigated by observing the effects of propranolol on electroshock induced through bitemporal electrodes in mice and rats by impulses of 0·2 sec 2–4 mA and 1·0 sec 10–12 mA respectively. The inhibition of tonic extensor seizures of the hind legs was regarded as partial blocking of seizures and the abolition of clonic seizures of all four extremities was the criterion for complete inhibition of electroshock.

Lethal doses (LD100) of nicotine bitartrate (8 mg/kg) and strychnine nitrate (0·6 mg/kg) were injected intravenously into mice. Propranolol was given subcutaneously 30 min before the intravenous toxicity test and survival was considered to be a sign of a protective action. Smaller doses of propranolol were necessary for antagonism of the lethal action of nicotine than for the antagonism of strychnine. Convulsions due to leptazol were not influenced even by 75 mg/kg of subcutaneously injected propranolol.

Antagonism to amphetamine toxicity was studied by the method of Burn & Hobbs (1957) on mice kept in groups of ten, or caged individually. Grouped and individually-caged mice were given (±)-amphetamine phosphate subcutaneously in doses of 100 mg/kg and 200 mg/kg respectively. The mortality rate was assessed 24 hr later. 5 mg/kg propranolol subcutaneously reduced the mortality in grouped mice from the 80% control level to 40%; a 10 mg/kg dose effected a further reduction to 10%. In individually-caged mice the same doses of propranolol effected similar percentage reductions in the mortality due to amphetamine.

These experiments indicate that propranolol has central nervous system depressant and anticonvulsive properties. This is interesting because dichloroisoprenaline, which shows some similarity with propranolol in the chemical structure of its side chain, causes excitement and has no anticonvulsant action. This change in the biological effect may be attributed to the presence of a naphthyl group in the molecule of propranolol. Our experiments give no answer to the question of whether there is any connection between the β-adrenergic blockade and the observed central nervous effects. Antagonism to amphetamine toxicity might be the test in which the adrenergic blocking action of the compound is asserted. Nevertheless, considering the overall effects, we believe that the drug has two independent actions, but further experiments are required to clarify this problem.

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Examination of cinnamon by direct thin-layer chromatography

SIR,—Cassia bark (*Cinnamomum cassia*) is the commonest substitute for cinnamon (*C. zeylanicum*), and whilst it should be possible to distinguish one from the other by macroscopical and microscopical means, analysts have expressed a need for aids to their identification. Dutta (1961) suggested mucilage ash values. It seems logical to attempt to make a distinction by examining the active principles, the essential oils. For this purpose thin-layer chromatography may be used as it has previously been applied to umbelliferous fruits (Betts, 1964). The oils of both barks contain cinnamaldehyde as the principal constituent, but cinnamon oil, unlike cassia oil, contains eugenol. Both of these constituents are not resolved on the usual silicic acid thin-layer plates, and eugenol is not easily detected in the presence of cinnamaldehyde by the spot detection methods previously described.

The modification to the previous technique (Betts, 1964) are as follows: magnesium silicate (TLC, Woelm), after mixing with absolute ethanol (12 g to 50 ml) was spread on plates and left to dry in air. Bark, 500 mg, was extracted with 2·5 ml acetone and spotted on the plates. After the solvent run eugenol was detected as a slate-blue spot, Rf approximately 0·45, by spraying with Folin & Ciocalteu's reagent (Hopkin & Williams Ltd.), as recommended for phenols by Waldi (1965). This was followed by spraying with dinitrophenylhydrazine solution to reveal cinnamaldehyde, Rf approximately 0·55. Folin & Ciocalteu's reagent provides a more sensitive test for eugenol than previous techniques and reveals the presence of eugenol in whole or powdered cinnamon.

An examination was made of various commercial (but not official) specimens of "cinnamon". Three samples of whole bark were obviously not cinnamon B.P. as they consisted of thick pieces, with much cork remaining, in single, double and a few compound quills. Microscopically they corresponded to a specimen of *C. burmanni* bark, kindly supplied by the Museum of the Pharmaceutical Society. This is an adulterant mentioned in the B.P.C. The diameter of the fibres was less than 30 μ, corresponding to true cinnamon, but calcium oxalate was present as small prisms instead of the normal acicular crystals. Chromatographically the samples were devoid of eugenol but contained cinnamaldehyde as did the Museum specimen. Museum samples of true cinnamon readily yielded a eugenol spot.

Seven commercial samples of powdered "cinnamon" were also examined. All the samples when chromatographed showed a cinnamaldehyde spot, but three were devoid of eugenol. These all contained fibres of diameter greater than 40 μ, and were probably samples of *C. cassia*. The large fibres were present in samples containing eugenol. Eugenol was also observed in a specimen which contained small calcium oxalate prisms. The cost of the samples was no guide to their quality. Only one sample appeared to be cinnamon B.P.

Of some Museum specimens of other *Cinnamomum* spp. barks examined chromatographically, *C. loureirii* (another adulterant mentioned in the B.P.C.) contained cinnamaldehyde without eugenol. *C. pedatinervium* and *C. sintok* contained eugenol without cinnamaldehyde, the former source being the