

kept frozen since it breaks down when kept as a liquid for long periods. However, frozen fluosol has a shelf life of 3 years as compared to 3 weeks for whole blood⁷.

The clinical uses of perfluorochemicals are many. Fluosol-DA has been used as a primer for the oxygenator during cardiopulmonary bypass in dogs⁸ as a liquid membrane oxygenator⁹, as a systemic hypothermic agent during surgery⁶ and as a cardioplegic medium¹⁰. Experiments using fluosol for preservation of organs before transplantation have been successful¹¹. Yet another field of use is in radiography. When brominated perfluorocarbon emulsions are given to animals with malignant tumours, the tumours became radio-opaque¹². This property could be made use of in tumour imaging using conventional radiography and also with computerized tomography⁶.

The earlier clinical drawbacks of fluosol-DA, have spurred the development of second generation substitutes, which include perfluorotrimethyl bicyclo (3,3,1) nonane (FTN), perfluoro N,N-dimethyl cyclohexyl-methylamine (FDMA), N-methyldecahydroquinoline, 1-methyl octa hydroquinolizine and N-cyclohexylpyrrolidine. Till date, the most advanced are FTN and a 4 to 6 FDMA/FTN mixture⁷. The main advantages of the newer products are stability at room temperature for over a year⁷, but they still need a highly saturated oxygen atmosphere for use.

The research on perfluorochemicals has currently reached a stage when their acceptance for regular clinical use is imminent. Nevertheless the need to use them at high oxygen concentration, their short intravascular half life, relatively long body life and toxic characteristics constitute a challenge for the development of an ideal blood substitute.

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HYPOGLYCEMIC ACTION OF *BOUGAINVILLEA SPECTABILIS* LEAVES

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DIABETES mellitus is a metabolic disease for which complete cure is unknown. But a number of plant products are traditionally known to alleviate diabetic condition. Studies of some plants like *Momordica charantia* (bitter gourd)¹, *Pterocarpus marsupium*² and *Phyllanthus niruri*³ have shown encouraging results. Recently there was a strong claim in newspapers⁴ that the leaves of *Bougainvillea* (B.V.) can cure diabetes mellitus. A preliminary scientific study of the above claim was, therefore, undertaken.

*B.V. spectabilis*⁵, common in Maharashtra was taken for the present investigation. The shade-dried, powdered (100 mesh) leaves (500 g) were extracted at room temperature, 4 times successively, by cold percolation of 2 lit of alcohol each time. Most of the solvent was removed in vacuo below 60°C and dried in a lyophilizer below 10°C giving 50 g of dried extract. This dried alcoholic extract was administered orally as an emulsion in water using Tween-80, to normal and

diabetic albino mice and the effects on their blood sugar level (BSL) were studied. Blood sample (0.2 ml) was taken from the jugular vein after sacrificing the animal and the BSL was estimated by the Folin Wu method⁶.

Effect on blood sugar level of normal albino mice:

The alcohol extract was administered orally to normal albino mice fasted for 18 hr⁷ at a dose level of 0.4 g/kg and their BSL was estimated after $\frac{1}{2}$, 1, 2, 4 and 8 hr intervals (vide table 1).

Effect on alloxan induced diabetes in albino mice:

Albino mice fasted for 18 hr were injected with alloxan (120 mg/kg) I.P. to induce diabetes⁷. After 48 hr of alloxan treatment one set of diabetic animals were administered with the extract (0.4 g/kg) orally as before with appropriate controls. After 2 hr of administration of the extract, that is 50 hr after alloxan treatment, their BSL was estimated. This was considered as acute treatment. Since this did not show any significant fall in BSL, in another set of experiments the drug 0.4 g/kg was administered at 24, 28, 48, 52 and 72 hr after alloxan treatment. Two hours after the last of the five doses, the BSL of both the control and extract treated animals were estimated (vide table 2).

Effect on glucose tolerance test (GTT.):

Albino mice were fasted for 18 hr. A group of the mice was administered with the extract 0.4 g/kg with appropriate controls. Glucose at the rate of 1.5 g/kg⁸ was given orally to both sets 30 min after administering the extract. Then, after intervals of 30, 60 and 90 min the BSL of all the animals was estimated. The BSL of control (only glucose administered) after 30, 60 and 90 min was 154.6, 123.3 and 113.5 respectively and those of the extract treated mice was 135.8, 97.7 and 106.3 respectively.

Effect of one week administration of test drug:

Groups of 10 mice (each weighing 25–30 g) of either sex were used for control and for each kind of treatment. Maximum doses upto 2 g/kg by oral and 1 g/kg by I.P. route did not show any toxicity or abnormal behaviour in mice upto 7 days and doses less than 0.4 g/kg were ineffective.

It was observed that when the extract was administered to normal albino mice fasted for 18 hr at a dose level of 0.4 g/kg hypoglycemia was observed after 30 min, reaching a maximum at the end of 2 hr with a significant ($P < 0.05$)⁹ decrease in BSL level which gradually goes back to normal beyond 8 hr (table 1).

In alloxan-induced diabetic albino mice, although

Table 1 Effect of *Bougainvillea* leaf extract on the blood sugar level of fasting mice

	Initial 0 hr	Mean blood sugar level in mg/100 ml after the administration of extract.				
		$\frac{1}{2}$ hr	1 hr	2 hr	4 hr	8 hr
Control	120 ± 1.5	120 ± 1.9	123 ± 1.0	120 ± 1.2	124 ± 1.6	123 ± 1.7
Treated with 0.4 g/kg of extract	120 ± 1.5	107 ± 1.6	92 ± 1.6	83.4 ± 1.5	99 ± 1.2	114.8 ± 1.3

Table 2 Effect of *Bougainvillea* extract on alloxan induced diabetes of albino mice

	Mean BSL in mg/100 ml	
	Control	Experimental
	Alloxan treated (120 mg/kg)	Alloxan (120 mg/kg) & extract (0.4 g/kg) treated
Acute (One dose after 48 hr)	206.2 ± 2.5	202.5 ± 2.7
Chronic (One dose each, after 24, 28, 48, 52 & 72 hr)	263.0 ± 3.0	165.1 ± 1.7

treatment with a single dose of 0.4 g/kg did not show any significant ($P > 0.05$) effect, repeated treatments of the extract for 3 days (five doses) brought about a significant ($P < 0.05$) fall in mean BSL (table 2). There was a significant fall in the BSL of the extract-treated animals 1 hr after glucose treatment.

It is concluded that the alcoholic extract of the leaves of *B. spectabilis* at a dose level of 0.4 g/kg has significant hypoglycemic effect in normal as well as alloxan-induced diabetic mice and it is free of any acute toxicity. Further experiments are in progress with bigger animals to evaluate the efficacy of the drug.

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BIOLOGICAL SIGNIFICANCE OF 37°C PHASE TRANSITION IN CHOLESTEROL

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CHOLESTEROL is an essential component of various biological membranes and body fluids. The under-

standing of the diverse natural and pathophysiological roles of cholesterol would depend on a thorough knowledge of its physicochemical properties. The much neglected but most striking among these is the occurrence of a phase transition at 37°C. That such a biologically significant molecule should exist in two polymorphic phases corresponding to temperatures just below and above normal human body temperature is perhaps physiologically unique. It is possible that the sharp overlap of the phase transition temperature with physiological temperature is an accidental one. However, considering the nature of evolutionary process it seems less likely that such a unique feature would entirely remain biologically unimplicated. We clarify here certain aspects of this phase transition as there might be more to it than its already speculated¹ implication in atherosclerosis.

The phase transition (37°C) studies of cholesterol reported so far¹⁻⁷ in general pertain to anhydrous cholesterol and inferences drawn therefrom may not be relevant to the *in vivo* situation, since cholesterol is known⁸ to exist as hydrated species *in vivo*. A clear evidence for the occurrence or nonoccurrence of the phase transition in the latter seems to be lacking^{4, 6, 7}. Differential scanning calorimetric (DSC) studies were made on authentic cholesterol samples, and phase transition was observed even in the hydrated species as seen in figure 1. Further, DSC scans were also made on a system consisting of cholesterol, human serum albumin and water. We expect binding of the serum protein to cholesterol in this system. Here again, the endotherm persists (also shown in figure 1). These results unambiguously show that the 37°C phase transition observed in anhydrous cholesterol also occurs in the hydrated species and even when presumably it is bound to a serum protein.

Another aspect, which needed clarification, was to see whether the observed phase transition in any way depends on the heating rates likely to be encountered in the *in vivo* situation. Several DSC scans were obtained with various heating rates down to 0.5°C/min. Not only the endotherm persisted but also showed no significant temperature shift in the phase transition.

Most of the cholesterol found in the blood stream is not present as unesterified cholesterol but as cholesteryl esters. A few of these derivatives have been reported⁹ to show the phase transition, a point to be verified in our further studies.

The suggestion of Lubowitz¹ that the etiology of atherosclerosis would be attributed to the departure of a person's body temperature from 37°C, is over simplification in explaining a complex issue as athero-