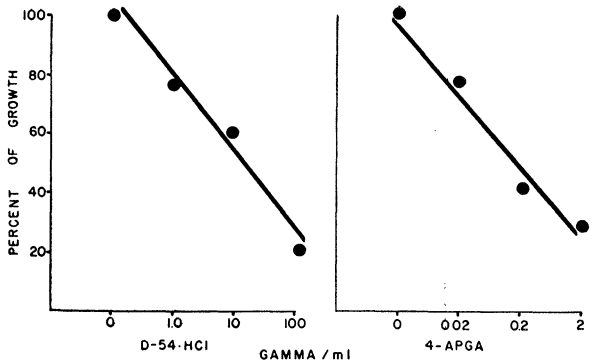

Fig. 2. Dose-response relationships.

dependent reduction that can be blocked effectively by D-54 · HCl. The reversal of this inhibition by thymine or thymidine indicates that as in bacterial systems, the metabolism of PGA is concerned with the biosynthesis of precursors of nucleic acid.

In other experiments, cytological studies on root meristems of *Vicia faba* seedlings and *Trillium erectum* rhizomes exposed to 0.1 to 0.2 μg/ml of 4-APGA or 1 to 2 μg/ml of D-54 · HCl for 24 hr at 25°C in the dark revealed a marked decrease in the number of cells in normal meta,- ana-, and telophase, and an accumulation of overaged prophase cells. Study of similar roots allowed to recover in distilled water for several hours following such exposure to D-54 · HCl indicated that a significant number of cells had been damaged permanently, as is evidenced by the presence of dying pyknotic cells and aberrant mitoses characterized by "sticky" anaphase bridges. These observations suggest that, like the inhibitory activity of 4-APGA in plant (*11*) and mammalian systems (*15*), the inhibitory activity of D-54 · HCl may be attributed at least in part to interference with normal mitosis.

Table 1. Reversal of D-54 · HCl (10 μg/ml) inhibition of *Brassica rapa* L seedling root growth.

Metabolite*	Amount (μg/ml)	Reversal (%)
p-Aminobenzoic acid (PABA)	1.0	0
PGA	10–1.0	0
Dihydro-PGA†	10–1.0	Inconsistent
CF	0.02	50
Thymine	8–2.0	15–20
Thymidine	0.8	50
	.2	25
Uracil	2.0	0
Nicotinic acid	1.0	10–15
Coenzyme I	50.0	10–15
Thiamine, pyridoxine, and so forth	0.1	0

* Higher concentrations in most instances were toxic, as is evidenced by inhibition of growth in comparable experiments without inhibitor.

† Prepared in these laboratories by E. J. Modest, after O'Dell *et al.* (*14*). Presumably the 7,8-dihydro-derivative.

These data suggest that (i) CF or closely related structures may be the form in which PGA is active in plant tissue, and (ii) D-54 · HCl interferes with nucleic acid metabolism by inhibiting the conversion of PGA to CF in a manner similar to that described in bacterial and mammalian systems.

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Detection of Coronary Atherosclerosis in the Living Animal by the Ergonovine Stress Test

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In studies on cardiac pain (*1*), we became interested in the effects of ergonovine on the coronary circulation in patients with effort angina and a normal resting electrocardiogram. Under these conditions, the ergonovine stress test (*2*) may produce alterations in the electrocardiogram indicative of coronary artery disease. The question arose whether the diagnostic value of this test as noted in man likewise applies to the living animal for detection of experimental coronary atherosclerosis. At present, pathologic changes in the coronary arteries can be ascertained only after sacrificing the animal. Electrocardiograms in the atherosclerotic dog (*3*) and chick (*4*) taken in the absence of additional stress on the coronary circulation have not shown significant abnormalities.

For this study (*5*), adult male rabbits fed a diet that contained 2 percent cholesterol, together with control animals fed a stock diet and maintained under otherwise identical conditions, were used (*6*). Series A comprised 16 rabbits kept on the diets for 11 wk, and series B, 18 rabbits kept for 20 to 22 wk on the diets, as shown in Table 1. The ergonovine stress test was carried out once on rabbits of series A, dur-

Table 1. Correlation of results of ergonovine stress test with atherosclerotic lesions in rabbits on stock and cholesterol diets.

	Series A		Series B	
	Control	Cholesterol	Control	Cholesterol
Weeks on diet	11	11	20–22	20–22
Rabbits	7	9	7	11
Weight (avg. kg)				
Start of diet	1.23	1.24	1.62	1.64
End of diet	2.03	1.83	2.28	2.05
Aortic atherosclerosis				
Thoracic (avg. degree)	0.06	0.83	0	3.80
Arch (avg. degree)	0.21	1.30	0	4.00
Coronary atherosclerosis				
No. rabbits	0	1*	0	11
Myocardial damage				
No. rabbits	0	0	0	11
Ergonovine test positive				
No. rabbits	0	0	0	11

* One rabbit showed a small atherosclerotic plaque, which did not compromise the lumen.

ing either the eighth or tenth week. In series B, four such tests were made on each rabbit at 7, 12, 16, and 20 wk, respectively, and a fifth test was made at 22 wk on rabbits still alive at this time. The last ergonovine test was made within a few days of sacrifice, except in one animal in which the interval was 4 wk. Electrocardiograms (leads II and IV) were taken (*7*) during pentobarbital anesthesia (10 to 20 mg/kg intravenously) just before and at intervals of 1, 3, 5, and 10 to 15 min after intravenous injection of ergonovine maleate (*8*). In series A, at each test two doses of ergonovine were used, 0.05 and 1.0 mg/kg, respectively, given about 15 min apart. In series B, only the smaller of these doses was given; in terms of body weight, this represents 10 to 30 times the dose similarly used for the ergonovine test in man.

Blood was drawn for total cholesterol determination (*9*) just before sacrificing the animal. The degree of aortic sclerosis was evaluated grossly according to an arbitrary scale of 0 to 4 (*10*). Hearts were fixed in 10 percent formalin, and in each case two cross sections, one near the base and one near the center, were studied microscopically. Blind test precautions were observed in the collection and analysis of data.

The results (Table 1) show a striking correlation of electrocardiographic changes after ergonovine with the presence of coronary atherosclerosis. In the nine cholesterol-fed animals of series A, after about 2 mo on the diet, significant pathologic changes in the coronary vessels were absent, and there were no electrocardiographic abnormalities. In contrast, there was extensive atherosclerosis of the thoracic aorta, and the serum total cholesterol showed on the average a 35-fold increase over that of the control animals.

In the 11 cholesterol-fed rabbits of series B, after 4 to 5 mo on the diet, there was extensive occlusive atherosclerosis of the small coronary arteries with myocardial damage (Fig. 1), and the ergonovine stress test became positive. Positivity was indicated by a drug-induced depression of the S-T segment of 0.5 mm or more below the isoelectric level (lead II or IV). After ergonovine injection, the S-T depression usually developed progressively and was most marked at the 5 or 10 to 15 min interval. After 20 or 22 wk on the cholesterol diet, a few animals showed spontaneous S-T depression before ergonovine, which was always intensified by the drug (Fig. 2).

Other effects of the high-cholesterol diet were an elevation of the serum total cholesterol and extensive lipidosis of the abdominal organs and the sclerae. The pathologic changes in the heart were similar to those previously described by Anitschkow (*11*). No control animal showed either coronary atherosclerosis or a positive ergonovine test.

Experiments are in progress to determine how early in the course of coronary atherosclerosis the ergono-

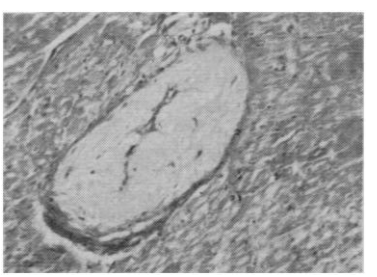

Fig. 1. Atherosclerosis of small coronary artery, rabbit No. 6, after 20 wk on cholesterol diet. Lipid-laden foam cells in intima practically occlude lumen. Upper right of field, myocardium shows spotty hyaline degeneration. (Hematoxylin-eosin × 200)

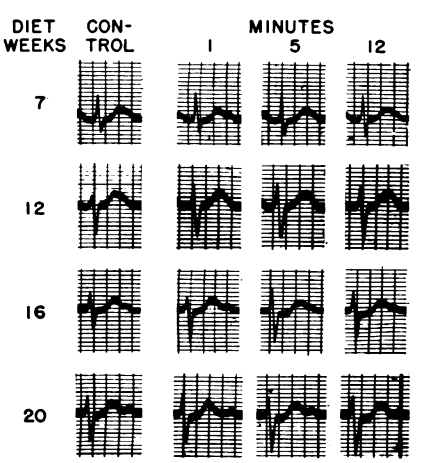

Fig. 2. Serial ergonovine stress tests made at monthly intervals on same cholesterol-fed rabbit as in Fig. 1. Lead II is shown. "Minutes" refers to time after ergonovine injection. Test becomes unequivocally positive after 16 wk on diet, as is clearly seen in the tracing taken at 12 min. After 20 wk on diet, control electrocardiogram becomes abnormal and depression of S-T segment is intensified by ergonovine. (Sanborn twin-beam electrocardograph, paper speed 75 mm/sec)

vine stress test becomes positive and to standardize the technique for the test in the rabbit.

In summary, data in the cholesterol-fed rabbit show marked correlation of positivity of the ergonovine stress test with occlusive atherosclerosis of the small coronary arteries and myocardial damage. It is suggested that the ergonovine stress test may provide a new experimental procedure for the study of coronary atherosclerosis in the living animal. The data are in accord with the previously reported correlation of a positive ergonovine test with clinical evidences of coronary artery disease in man.

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6. These rabbits were made available to us by Herald Cox, department of viral and rickettsial research, Lederle Laboratories, Pearl River, N.Y.
7. Tracings were taken on each animal with both the Sanborn visocardiette and twin-beam electrocardiograph.
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Communications

Isolation of Anaerogenic *E. coli* 026:B6 Serotype from a Case of Calf Scours

The *Escherichia coli* serotypes most commonly associated with infantile gastroenteritis are 0111:B4, 055:B5, and 026:B6. The latter two serotypes have been reported in case of animal diarrheas. Ørskov (*1*) and Smith (*2*) identified three fermentation types of the *E. coli* 026:B6 group that were isolated from autopsies of newborn calves that died from calf (white) scours. Fey (*3*), isolated *E. coli* 026:B6 from calves suffering from septicemia and dysentery and from cattle with mastitis. Ulbrich (*4*) reported the 055:B6 serotype from fatal cases of scours.

During the past year extensive investigation (*5*) of coliform strains present in the intestinal tract of healthy and diseased calves has been undertaken. One strain, 125M, was isolated at autopsy from the ileum of a calf that died of a severe case of scours.

The biochemical reactions of this strain were determined by inoculating phenol red broth containing 0.5 percent of the sugars and incubating for 96 hr at 37°C. Acid only was formed from dextrose, lactose, maltose, mannitol, xylose, arabinose, sorbitol, and sucrose. Adonitol, dulcitol, rhamnose, and inositol were not fermented. The reaction in salicin was variable. The methyl red and indole tests were positive, while Voges-Proskauer, citrate, and urea reactions were negative. Nitrite was reduced to nitrate but hydrogen sulfide was not formed.

The serological typing of the original culture (125M) and a culture (204D) isolated after successful calf passage was carried out by W. H. Ewing of the Communicable Disease Center, Chamblee, Georgia. Both cultures were reported as the anaerogenic *E. coli* serotype 026:B6.

Several successful passages in young calves have been made. The culture produced a fatal case of scours in three calves when it was fed to them by mouth. Control calves raised under the same management conditions remained normal.

This strain of *E. coli* is identical, biochemically and serologically, with Ørskov's anaerogenic type 3 (*1*) and is believed to be the first reported in calves outside of Europe.

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Use of Centralized and Departmental Libraries in College and University Geology Instruction

Three years ago I sent a questionnaire to 88 geology departments in the United States and Canada asking whether centralized or departmental library facilities were preferred and why. The same study has been made in chemistry by Broberg and Dunbar (*1*) with similar results.

I received 80 answers, a good return on my questionnaire, with the last questionnaire coming in a year and a half ago (*2*). In spite of my delay in reporting the results, I feel that the data are still generally valid and, hence, should be presented now.

The questionnaire included the items in sections 1 to 4 of Table 1. The data in section 5 were compiled from answers to sections 1 to 4 and to the following