of the ν_3 band in the IR spectra could be due to more covalent cation-anion bond character in CdHAp.

The thermogram was obtained using a Derivatograph (Hungary) which simultaneously recorded TGA and DTA effects, 27.0% loss in weight was observed in the TG curve at 980°C. Three types of loss of water were seen in the TG curve (figure 2). While loss in weight (TG) between 40°–120°C and a small endo at 105°C (DT) indicated loss of free water, loss between 120°–420°C (TG) and large endo at 322°C (DT) was due to adsorbed; loss between 420°–760°C (TG) and a small endo at 550°C (DT) was due to loss of lattice water. The disappearance of IR absorption peak at 1660 Cm^{-1} after heating further indicated the presence of absorbed water. The activation energy for the process of dehydration was calculated using Freeman and Carroll's equation and was found to be 4.390 kcal $mole^{-1}$.

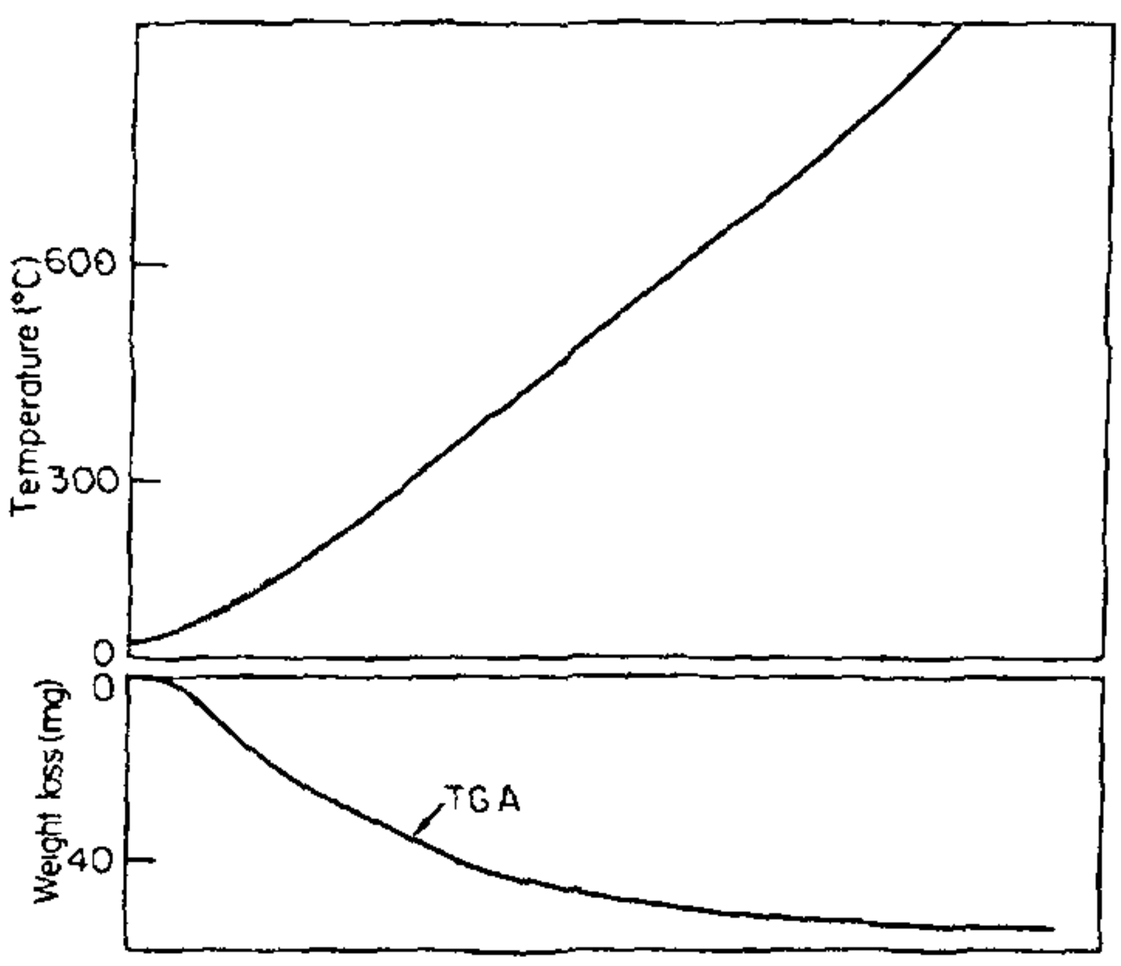

Figure 2. Thermogravimetric (TG) and differential thermal (DT) analysis of cadmium hydroxyapatite.

The solubility of the sample was studied in the pH range 5.0–8.0 at a given temperature and between 37°–52°C at an interval of 5°C at pH 5.0 under a constant ionic environment[1] of $NaNO_3$. The solubility was found to decrease with (i) increase of pH and (ii) increase of temperature. The former observation could be explained on the proton accepting tendency of the phosphate ion[3]. Since $CdHPO_4$ was established as the virtual solid phase[3] controlling the solubility-equilibria of $CdHPO_4$ at pH 5.0, and since $CdHPO_4$ too exhibited retrograde solubility[4], the later observation is thus understandable.

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A *BACILLUS* SPECIES CAPABLE OF UTILISING DIPICOLINIC ACID AS CARBON AND NITROGEN SOURCE: ISOLATION AND IDENTIFICATION

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THE degradation of dipicolinic acid (DPA) an essential component for true spore formation[1-4] by the members of *Bacillaceae* has not been studied so far. The present investigation was therefore undertaken to isolate and identify an aerobic spore former capable of utilizing DPA. The appropriate dilutions (1 : 100) of the soil extract were heated at 80°C for 30 min before inoculating a medium (minerals and DPA). The flask was incubated on a rotary shaker at 30° ± 1°C and allowed to sporulate. Spores formed were diluted and appropriate dilutions were inoculated into the fresh medium after heating at 80°C for 30 min. This procedure was repeated ten times successively before a single colony was isolated. The media and the methods used for various biochemical tests have been described[5]. The organism was grown in a medium containing (g/l of distilled water) $FeSO_4.7H_2O$, 0.001; $CuSO_4.5H_2O$, 0.01; $ZnSO_4.H_2O.7H_2O$, 0.01; $MnSO_4$, 0.1; $MgSO_4.7H_2O$, 0.2; $CaCl_2.2H_2O$, 0.08; K_2HPO_4, 0.25 and DPA, 0.4. The solutions of K_2HPO_4, $CaCl_2$ and DPA were sterilized separately and added before inoculation. The pH of the medium was adjusted to 7 ± 0.1 before sterilization.

The organism was grown in liquid medium using an active culture technique[6] and the growth was measured in terms of optical density at 440 nm with a Spectronic-20 (Bausch and Lomb). Total viable counts (TVC), octyl alcohol counts (OSC), and heat stable counts (HSC) were determined[8]. The measurements represent the average of duplicates in 1 ml of culture. Percentage of heat stable forms (HSF) were calculated by the following formula[9].

$$\% \text{ heat stable forms} = \frac{\text{HSC} \times 100}{\text{OSC}}$$

DPA was estimated by the method of Janssen *et al*[7].

The organism isolated from soils by using minerals and DPA as the sole carbon and nitrogen source was gram-positive, the cells did not form chains but highly motile during early logarithmic phase. On the basis of various biochemical and morphological tests, this organism was identified as a strain of *Bacillus brevis*. This identification was further confirmed by Prof. Ruth E. Gordon, University of New Jersey, USA (Personal communication).

Results indicated (table 1) that 2.4 mM of DPA supported normal growth and sporulation of the culture, higher concentrations were inhibitory. Therefore, for further studies 2.4 mM of DPA was used. As evident from figure 1, the growth was quite slow and the extent of sporulation was more than 90% after 70 hr of incubation of an active culture. This organism not only utilizes DPA as a substrate but also synthesizes DPA during late stationary phase. This observation is quite interesting because it appears that the organism possesses the regulatory mechanism for DPA metabolism. Our results suggested that the first step(s) involved in the DPA degradation by this bacterium was hydroxylation at position C-4 of the DPA ring followed by its fission[9], which showed that the biochemical steps required in its catabolism were contrary to those established for its biosynthesis[11,12]. Similar observations have been reported[10] in the degradation of DPA by *Achromobacter* sp. which do not form spores.

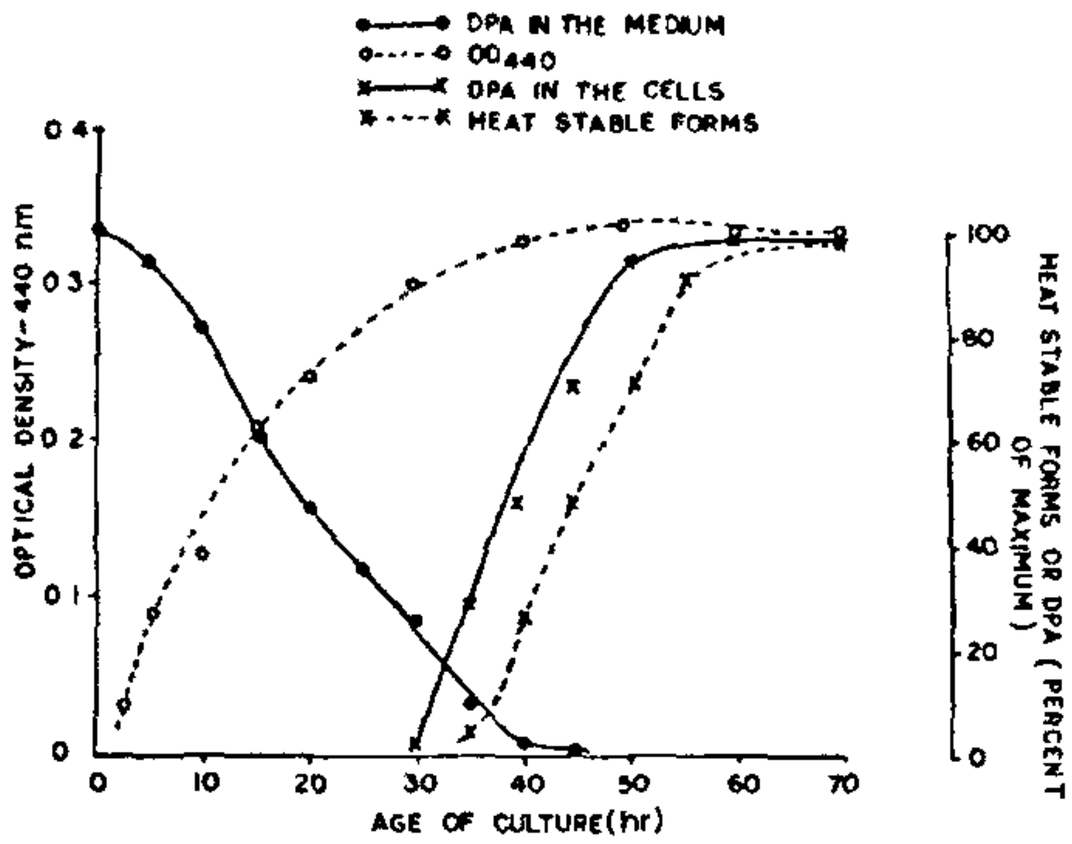

Figure 1. Growth and sporulation of *Bacillus brevis* in DPA medium. The organism was grown by following an active culture technique in 1 litre flask containing 200 ml of medium with continuous shaking at 30°C.

Table 1 *Utilization of various concentrations of dipicolinic acid by Bacillus sp.*

DPA (mM)	TVC	OSC	HSC
0.59	2.5×10^5	2.0×10^5	1.7×10^5
1.50	5.2×10^6	3.1×10^6	3.0×10^6
2.00	3.7×10^6	3.65×10^6	3.6×10^6
2.4	2.2×10^7	2.21×10^7	2.0×10^7
3.0	3.5×10^6	3.4×10^6	3.4×10^6
3.8	$< 10^4$	$< 10^4$	$< 10^4$

DPA grown vegetative cells were washed twice with distilled water before incubating with various concentrations of DPA in fresh medium.

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ROLE OF *GUM ARABICA* AND *GUM CATECHU* IN GLYCEMIA AND CHOLESTEROLEMIA

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THE gums of *Acacia arabica* and *Acacia catechu* find an important place in delicious food preparations on festive and fasting occasions. Since the authors[1] reported the hypocholesterolemic and hyperglycemic effects of *Guar gum*; an interest was aroused to study the effects of *Gum arabica* and *Gum catechu* on blood sugar and serum cholesterol levels.

Normal albino rats weighing 150 to 200 g body weight were employed in three different groups. Each group comprised of 8 rats and all the rats were caged separately. Rats of group A were fed with control diet (Hindustan Lever Ltd., Bombay). The diets of groups B and C contained 15% *Gum arabica* and *Gum catechu* respectively.

Initial blood sugar and serum cholesterol in rats were estimated by bleeding the live rats[2], without anaesthesia, in the well-fed state. The blood sugar was determined by the modified method of Folin-Wu[3] and serum cholesterol by the method of Henley[4]. The rats were given the respective diets *ad lib* for a week. Then they were bled again in the well-fed state and sugar and cholesterol were estimated. The results were statistically analysed.

The rats were found to gain in body weight after one week feeding. The blood sugar and serum cholesterol in rats of group A, which were maintained on control diet, remained constant. But *Gum arabica* decreased blood sugar highly significantly in group B (table 1) and the serum cholesterol did not fall significantly. *Gum catechu* did not affect blood sugar (Group C) but serum cholesterol was increased highly significantly.

The gums had no consistency in their behaviour towards blood sugar and serum cholesterol. Whereas *Guar gum*[1] was hyperglycemic and hypocholesterolemic; *Gum arabica* was hypoglycemic and normocholesterolemic and *Gum catechu* was normoglycemic and hypercholesterolemic. The gums are digestible carbohydrate derivatives; normally they would be expected to raise blood sugar level and it was so by *Guar gum*. But the normoglycemic behaviour of *Gum catechu* and hypoglycemic effect of *Gum arabica* indicated the presence of some powerful hypoglycemic activity therein, which suppressed the elevation of sugar level. Thus the gums, especially *Gum arabica* emerged interesting for the study on carbohydrate metabolism and beneficial to the diabetic patients. On fractionation with suitable solvents, a powerful hypoglycemic agent might be isolated.

In the recent findings[5,6] the feeding of hypoglycemic substances to the induced diabetic rats, merely suppressed the diabetes, that too during feeding period only and the blood sugar shot up on discontinuation of the diet, so a different behaviour could not be expected from *Gum arabica*.

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Table 1 *Blood sugar and serum cholesterol levels in rats and their statistical significance*

	Group		
	A	B	C
Diet	Control	15% Gum arabica	15% Gum catechu
Blood sugar			
Initial	99±6	96±3	103±6
After a week	99±6	78±4 ($P<0.001$)	105±8
Serum cholesterol			
Initial	93±7	93±7	90±5
After a week	92±7	90±6	108±6 ($P<0.001$)

(Values are mean + SD and are expressed in mg/dl)

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