catalyst having identical wt. % concentrations of Pd may be suggestive of the reduction of catalyst surface area due to ZnO-Cr_2O_3 incorporation.

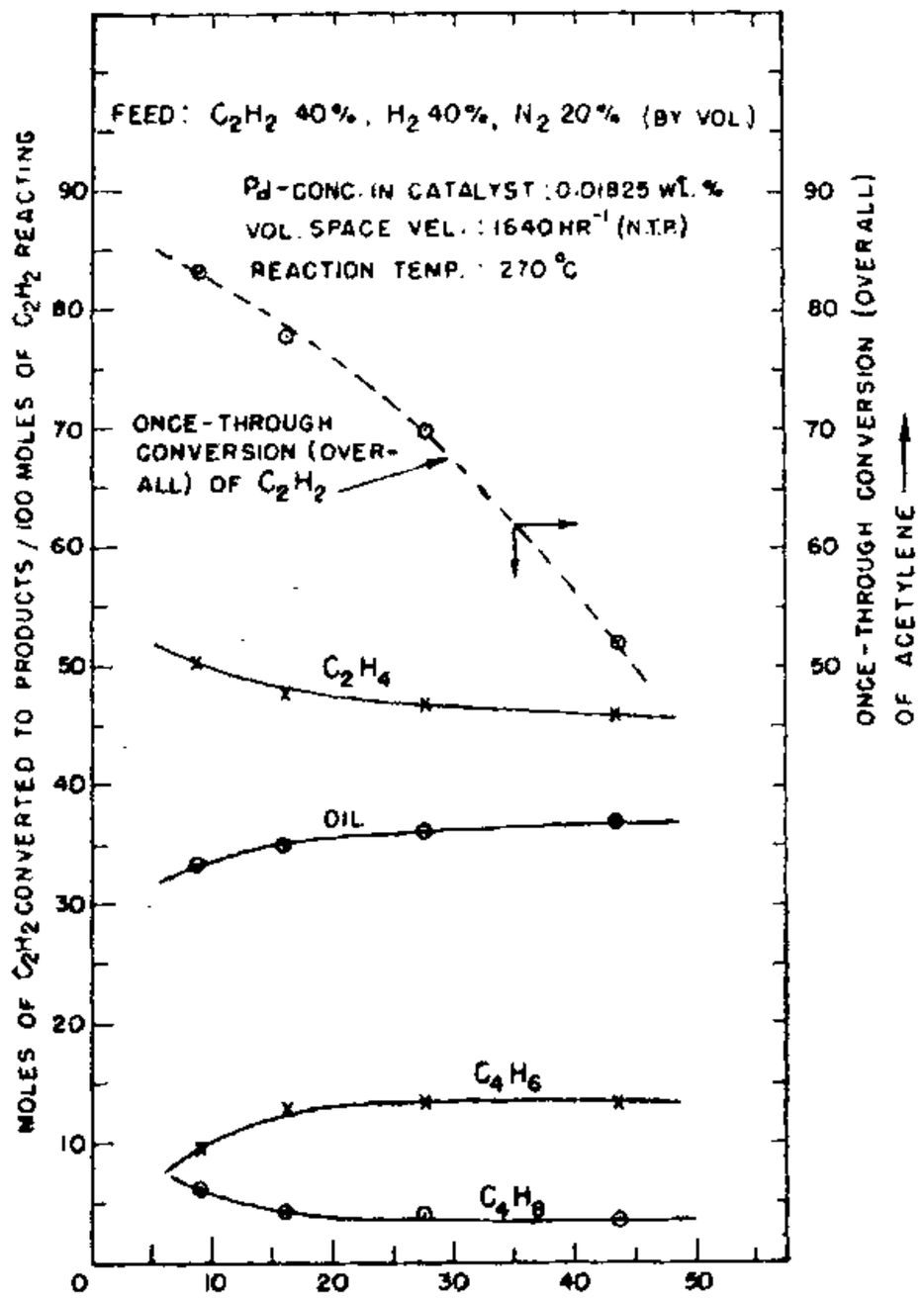

FIG. 1

Authors' sincere thanks are due to Prof. N. R. Kuloor for his keen interest in this investigation and to the C.S.I.R., New Delhi, for the award of a Research Fellowship to one of them (M.C.).

Dept. of Chemical Engg., MANAS CHANDA.
Indian Institute of Science, S. S. GHOSH.
Bangalore-12, *August* 1, 1966.

1. Tadao Shiba, *Repts. Govt. Chem. Ind. Res. Inst., Tokyo*, 1954, **49**, 287.
2. Manas Chanda and Ghosh, S. S., *Curr. Sci.*, 1965, **34** (17), 508.

CARDIOACTIVE GLYCOSIDES FROM *MELODINUS MONOGYNOUS* "ROXB"

Melodinus monogynous (Syn. *Neriuum pisidium*) is a medicinally efficacious climbing shrub, found abundantly in Assam, Sikkim and Sylhet. Its bitter roots have been reported to possess hypnotic and antimalarial properties.[1,2] Chatterjee and co-workers[3] isolated a glucoside melodin ($C_{25}H_{36}O_8.H_2O$, M.P. 128° C.) which yielded melodinin and *D*-glucose on hydrolysis. However, the chemical nature of melodinin has not yet been ascertained.

Reichstein *et al.*[3,4] have extensively investigated other species of Nerium (*Nerium odorum*[6] and *Nerium oleander*,[7,8]) and found that they were rich source of digitalis glycosides. This led the present authors to reinvestigate the roots of *Melodinus monogynous* for the detection and characterisation of its cardiotonic constituents. Our preliminary investigations indicated the presence of several digitalis type of glycosides in its root bark.

The dried and powdered roots, collected in Assam, were extracted by percolation with 50% to 90% aqueous alcohol. The alcoholic extract was concentrated under reduced pressure, treated with freshly prepared lead hydroxide to remove the tannin contents, and filtered. The purified aqueous concentrate was shaken with ether, chloroform and chloroform-alcohol (2 : 1) successively for the separation of the cardenolides of different polarities.

The paper-chromatographic controls of various fractions, using Kaiser systems[9] [benzene-chloroform (7 : 5) saturated with formamide and chloroform saturated with formamide] revealed the presence of a total of nine Kedde positive[10,11] constituents. They have been provisionally named as α, β, A, B, C, D, E, F and G. However, α and β could not be detected in the original ether extract, their presence was detected in paper-chromatogram using benzene-cyclohexane (1 : 1) saturated with formamide system in the mother liquor of substance A only after the separation of ether fraction ingredients by column chromatography over neutral alumina. They were separated by preparative paper-chromatography.

The less polar substances A, B, C and D were obtained in paper-chromatographically pure state by adsorption chromatography over neutral alumina and silica gel. The more polar substances E, F, and G were separated by partition chromatography[12] over Celite 535 using formamide as a stationary phase and chloroform saturated with formamide as the mobile phase. The properties of eight isolated crystalline substances are being listed in Table I.

We are grateful to Dr. A. C. Roy and Mr. B. N. Kaul, Processing and Development Division, C.D.R.I., Lucknow for their assistance in the extraction of plant material and to Dr. R. Neher, Ciba, Basel, for the analysis.

TABLE I

Substance	M.P. °C.	Solvent of crystallisation	$[\alpha]_D$ in Methanol	Analysis			
				Calculated		Found	
				%C	%H	%C	%H
Substances* a	.. 101–103	Acetone	−10	..	..	..	..
,, A ($C_{26}H_{38}O_4$)	.. 168	Acetone-pentane	−45	75·34	9·24	75·23	9·31
,, B†	.. 246	Acetone-ether	..	..	..	..	..
,, C ($C_{23}H_{34}O_6$)	.. 228– 32	MeOH-ether	+56	67·95	8·43	68·40	8·60
,, D ($C_{37}H_{52}O_{16}$)	.. 98–100	Acetone-ether/water	−26	59·03	6·96	58·90	7·11
,, E ($C_{35}H_{52}O_{14}$)	.. 118–124	Chloroform-ether/water	−26	60·30	7·50	59·70	7·50
,, F ($C_{29}H_{44}O_9$)	.. 182– 84	Isopropanol-water	−24	64·91	8·26	65·39	8·46
,, G*	.. 220–225	Alcohol-water	..	..	..	..	..

* They could not be analysed, due to their small amounts; † Identified as digitoxigenin by mixed M.P. with authentic sample and comparison of its R_f on paper-chromatogram.

Dept. of Chemistry, Lucknow University, Lucknow, *April* 18, 1966.

S. O. D. BHATNAGAR.
M. P. KHARE.

1. Watt, G., *Dictionary of Economic Products of India*, Govt. of India Press, Calcutta, 1891, Part 5, p. 226.
2. Wehmer, C., *Die Pflanzenstoffe*, Gustav Fischcer, Jena, 1931, **2**, 978.
3. Chatterji, S. K., Sharma, V. N. and Dhar, M. L., *J. Sci. Ind. Res.*, 1954, **13 B**, 546.
4. Vischer and Reichstein, T., *Helv. chim. Acta*, 1944, **27**, 1332.
5. Rangaswami, S. and Reichstein, T., *Ibid.*, 1949, **32**, 939.
6. — and — *Pharm. Acta. Helv.*, 1949, **24**, 159.
7. Neumann, W., *Ber.*, 1937, **70**, 1547.
8. Jäger, H., Schindler, O. and Riechstein, T., *Helv. Chim. Acta*, 1959, **42**, 977.
9. Kaiser, F., *Ber.*, 1955, p. 557.
10. Kedde, D. L., *Dissertation (Leyden)*, 1946.
11. Bush, I. E. and Taylor, D. A. H., *Biochem. J.*, 1952, **52**, 643.
12. Lichti, H., Tamm, Ch. and Reichstein, T., *Helv. chim. Acta*, 1956, **39**, 1914.

STUDIES ON THE EFFECT OF CHLORO CHOLINE CHLORIDE ON THE EARLY ROOT GROWTH OF RICE

CHLORO CHOLINE CHLORIDE (CCC) a new growth regulator is known to retard longitudinal growth of plants. Its action is possibly based on the physiological effects of certain ammonium bases, which may be considered as antagonistic to the effect of gibberellins. It has been observed that the addition of gibberellic acid (GA) can reduce the inhibitory effect of CCC on various plants.[1,2] It is also noticed that inhibitory effect of certain growth regulators like maleic hydrazide can be minimised by the addition of certain heavy metals like Mn, Cu, Co, Zn, Ni and Mo.[3] The present investigation is aimed to determine the effect on root elongation in rice by CCC alone and in combination with gibberellic acid and micronutrients.

Seeds of an early variety of rice, *Ptb. 10* were soaked in water for 24 hours and germinated in petri plates on a filter-paper at 30° C. The seeds after sprouting (initial length of the root is almost zero) were kept suspended from a filter-paper along the side of the specimen tube (3" × 1") for measurement of root elongation in different concentrations of test solutions. Ten such seeds were kept in each tube. Each treatment was replicated thrice. The tubes were kept in a dark chamber at a room temperature (22° C.) and root growth measurements were recorded after 60 hours. The results presented in Table I indicate a significant inhibition in root growth of rice at 500 and 1,000 ppm concentration of CCC.

Similar tests were conducted to study the optimum concentration of gibberellic acid (GA) for stimulation of root growth in rice at 0, 1, 10, 50 and 100 ppm. The results in Table I

TABLE I

Mean length of the root in mm.

Concentration (ppm)	CCC	GA
Control	33·3	33·3
1	–	35·0
10	37·4	39·7
50	30·8	40·1
100	32·9	31·7
500	13·2	–
1000	9·7	–
C.D. (0·05)	5·9	Not significant.

show that root growth is considerably stimulated at 50 ppm level.

With a view to ascertain if the root inhibition noticed at 500 ppm of CCC could be minimised by addition of GA (50 ppm) or a micronutrient solution containing Fe (10 ppm) concentration further experiments were conducted adopting the same technique described above. The micronutrient used in the study