

Figures 1-8. 1. C-metaphase $\times 1300$ 2. Sticky metaphase showing unequal segregation $\times 1200$ 3. A polyploid cell with gaps $\times 1350$ 4. Metaphase with breaks $\times 1000$ 5. Sticky anaphase bridge $\times 950$ 6. Diagonal anaphase $\times 850$ 7. Cell with micronuclei $\times 1000$ 8. A binucleate cell $\times 1050$.

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1. Mudd, J. B. and Kozlowski, T. T., *Response of plants to Air Pollution.*, Academic Press, London, 1975.
2. Fishbein, L. *Mutat Rev.*, 1976, 32, 267.
3. Oblisami, G. and Rajannan, G. *Proc. Int. Symp. on Environmental Agents and their biological effects.*, Hyderabad, 1978.

4. Ravindran, J. N. and Ravindran, S. *Cytologia.*, 1978, 43, 565.
5. Rangaswamy, V., Shanthamurthy, K. B. and Govindappa, D.A. In *Perspectives in cytology and genetics.*, (Eds) G. K. Manna and U. Sinha, Hindsania Publishers, New Delhi, 1980, 306.
6. APHA, AWWA and WPCF. *Standard methods for the examination of water, sewage and industrial wastes*, APHA Inc., New York 1976.
7. Somashekar, R. K., Ramaswamy, S. N. and Govindappa D. A., *Indian J. Environ. Hlth.*, 1982 (in press).
8. Somashekar, R. K., Ramaswamy, S. N. and Govindappa D. A., *Proc. Indian Natl. Sci. Acad.*, 1982 (in press).
9. Shanthamurthy, K. B. and Rangaswamy, V. *Cytologia.*, 1979, 44, 921.

THIOACETAMIDE CAUSES INCREASE IN LEUCOCYTES IN *CHANNA PUNCTATUS* (BL.).

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THIOACETAMIDE is a known carcinogen. Its main target organs are thyroid and in some cases liver¹⁻³. Its carcinogenic effect on blood has not been reported so far.

The fish *Channa punctatus* collected from local resources, after acclimatization in the laboratory for ten days, were transferred to aquaria. A sub-lethal concentration of thioacetamide 50 mg/l was dissolved in unchlorinated water (pH 7.5; total solids 14.7 mg/l; alkalinity as CO₃ 57 mg/l; alkalinity as OH⁻ 4.5 mg/l; hardness 60-70 mg/l; dissolved oxygen 6-7 mg/l). The blood parameters were studied after the interval of 15, 30 and 45 days.

The observations (Table 1) reveal that thioacetamide sub-lethal concentration 50 mg/l causes decrease in the total erythrocytes count and haemoglobin percentage. On the other hand a rapid increase in the total number of leucocytes count was observed. The increase in leucocytes count is upto approximately 40 times in 45 days. A considerable increase in the percentage of immature erythrocytes and in erythrocytes sedimentation rate (ESR) also suggest leukaemogenic effects in *Channa punctatus*.

The present observations reveal that thioacetamide probably interferes with the development of erythro-

TABLE I

Treatment of Thioacetamide in days and different blood parameters

Time (days)	Erythrocytes count $\times 10^6$ /cmm.	Hb%	Leucocytes count $\times 10^3$ /cmm.	% of immature erythrocytes	Erythrocytes sedimentation rate
Control	3.95 ± 0.26	14.1 ± 0.7	0.06 ± 0.01	3.9	7.0 ± 1
15	3.80 ± 0.21	13.9 ± 0.8	1.05 ± 0.11	17.0	11.3 ± 1.2
30	3.40 ± 0.19	13.3 ± 0.9	1.16 ± 0.11	26.3	14.5 ± 1
45	2.35 ± 0.23	12.1 ± 0.3	2.35 ± 0.16	65.2	18.0 ± 2

cytes in haemopoetic tissues thereby creating leukemogenic conditions.

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1. Fitzhugh, O. G. and Nelson, A. A., *Science*, 1948, **108**, 626.
2. Napalkov, N. P., In *Potential carcinogenic hazards from drugs*, (ed. R. Truhaut), Springer-Verlag, Berlin, 1967, 178.
3. Ulland, B. M., Weisburger, J. H., Weisburger, E. K., Rice, J. and Cypher, R., *J. Natl. Cancer Inst.*, 1972, **49**, 583.

SYNTHESIS OF QUEEN BEE PHEROMONE

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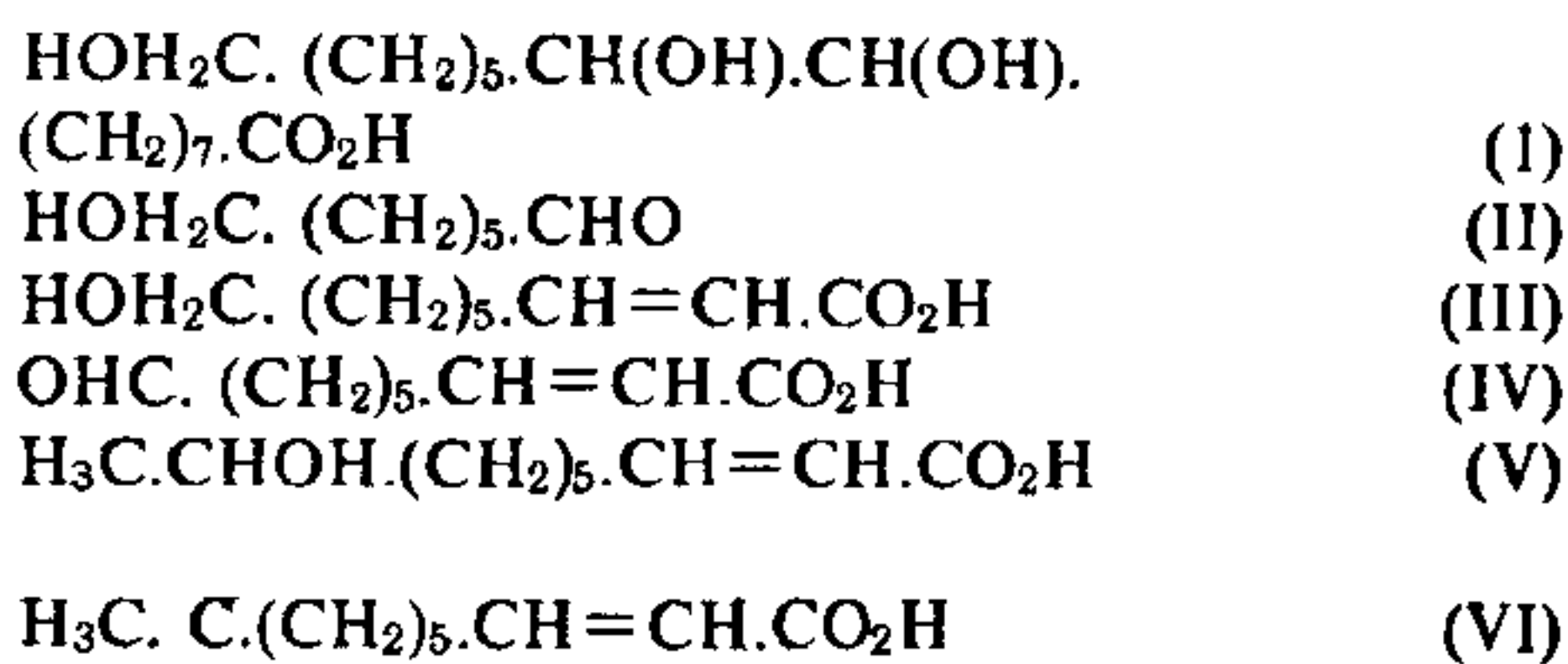
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THE mandibular glands of the queen honey-bee, *Apis mellifera*, secrete the queen substance which principally contains 9-oxo- Δ^2 -decenoic acid. The queen substance inhibits the development of ovaries and prevents queen rearing in workers. It also acts as sex attractant in mating¹.

9-oxo- Δ^2 -decenoic acid (VI) has been synthesised from a number of starting materials²⁻¹⁰. We report here its synthesis from 7-hydroxyheptanal, one of the periodate oxidation products of aleuritic acid, the major constituent acid of shellac.

7-Hydroxyheptanal (II), on condensation with malonic acid in the presence of pyridine gave an α , β -unsaturated hydroxy acid (III), which on oxidation with pyridiniumchlorochromate resulted in an unsaturated aldehydic acid (IV).

The carbinol (V) obtained by the condensation of IV with CH_3MgI on further oxidation with aluminium tert. butoxide yielded 9-oxo- Δ^2 -decenoic acid (VI).



7-Hydroxyheptanal (II)

Threo-aleuritic acid (I, m.p. 99-100°, 8 g) in methanol-water (400 ml, 1:1) at 40°C on sodium periodate oxidation¹¹ for 10 min and on usual workup afforded 7-hydroxyheptanal as liquid (3.2 g). It was purified through a column of neutral alumina by eluting with ether. I.R.(Neat): 3250, 1720 cm^{-1} (Found: C, 64.80; H, 10.72. Calcd. for: $\text{C}_7\text{H}_{14}\text{O}_2$: C, 64.70; H, 10.80%).

9-Hydroxy- Δ^2 -nonenoic acid (III)

The above hydroxyaldehyde (II, 3 g) was heated on a steam bath for 4 hr with malonic acid (3 g) in dry pyridine (5 ml). Extraction with ether yielded the unsaturated hydroxy acid as thick liquid (2.8 g), which was purified over a column of neutral alumina in ether. I.R.(Neat): 3250, 1700, 970 cm^{-1} (Found: C, 62.72; H, 9.24. Calcd. for $\text{C}_9\text{H}_{16}\text{O}_3$: C, 62.80; H, 9.30%).

Δ^2 -Noneldehydic acid (IV)

A solution of III (2g) in dry methylene chloride (10 ml) was added with stirring to a suspension of pyridinium chlorochromate (3.28 g) and anhydrous sodium acetate (0.25 g) in dry methylene chloride. After 2 hr, dry ether was added and the supernatant decanted from the black gummy mass. The ethereal extract was then passed through a column of neutral alumina to remove the impurities and the solvent was