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EFFECT OF CAFFEINE ON PUFFING PATTERN IN THE POLYTENE CHROMOSOMES OF SALIVARY GLANDS OF *DROSOPHILA MELANOGASTER*

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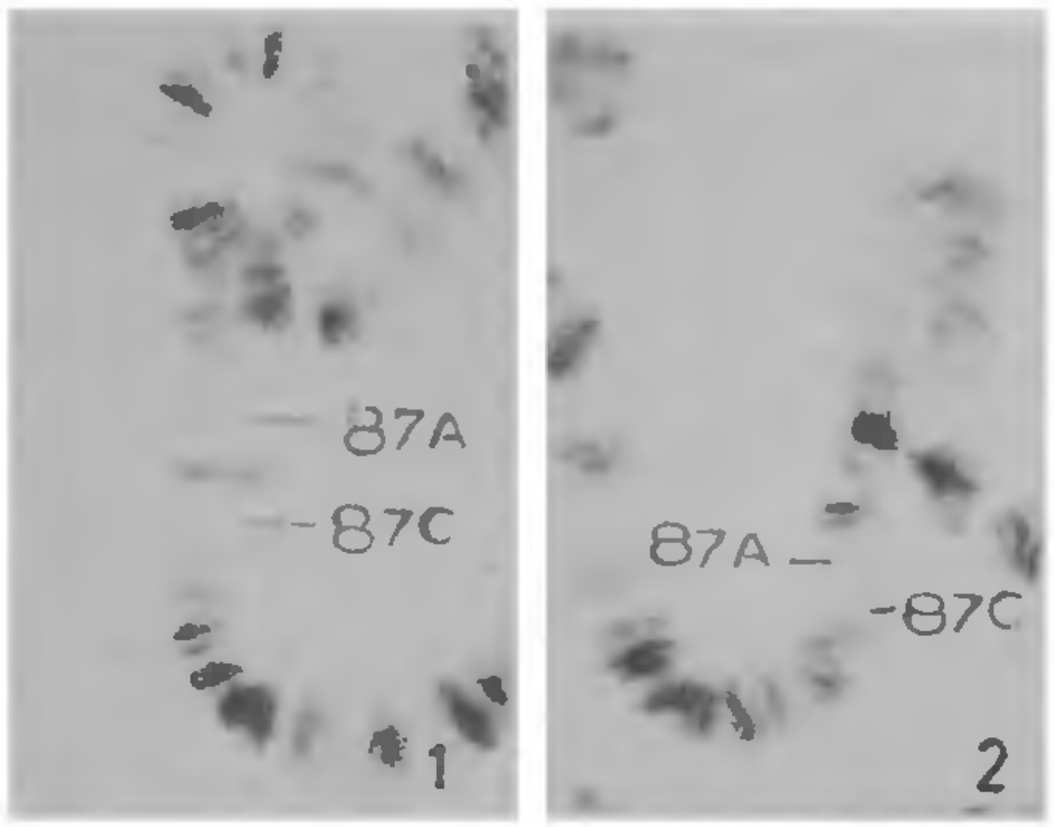
CAFFEINE (1,3,7-trimethylxanthine), a plant product and a member of methylxanthine group is widely used in general beverages and is being consumed by a large section of the population. It has also therapeutic use as central nervous system stimulant. Caffeine has some antimitotic activity and causes chromosomal abnormalities in both plant and animal cells. A wide range of other cellular activities are also affected by caffeine[1]. But no information is available on the effect of caffeine on puffing activity. Larval salivary glands of *Drosophila* when treated with heat shock or uncouplers of oxidative, phosphorylation result in the induction of a certain group of puffs[2–4]. These puffs are also induced by antibiotics, valinomycin and dinactin[5]. It was suggested that the cellular level of ATP plays an important role in the induction of heat shock puffs[4]. Since the group of methylxanthines, to which caffeine belongs, elevates the cyclic AMP level in the tissues[6], its effect on the puffing activity is studied.

Salivary glands of late third instar larvae of *D. melanogaster* Oregan K inbred stock reared at 24° C on a corn meal food enriched with extra yeast, were used in this experiment. The sister glands were dissected out and incubated in Ringer solution[4]. One of the glands was treated with caffeine, freshly dissolved in Ringer solution, while the other gland was kept in nomal Ringer solution as control. After the incubation time (40–90 min) the glands were fixed in 1:3 mixture of acetic acid and methanol, stained with 2% aceto-orcein for 15 min, squashed in 50% acetic acid and sealed with DPX. Puffs were scored according to the chromosomal maps of Bridges[7]. Six sets of glands were used in this experiment.

Incubation of the salivary glands in Ringer solution containing caffeine (10^{-2}M) at 24 C for 1 hr induces the heat shock puffs. The intensity of puffing was greater in 87A and 87C while it was relatively small in 63C, 67B, 93D and 95D puffs (figure 1). Other heat shock puffs were ineffective. The puffs are induced within 30–40 min after incubation with caffeine and they attain their maximum size after 60 min. When incubated for 90 min there was no change in the size of the puffs. None of the heat shock puffs is stimulated in the control glands (figure 2).



Figures 1, 2. **1.** Puffs 87A and 87C induced in salivary gland chromosome (3R) of *D. melanogaster* by *in vitro* treatment with caffeine (10^{-2}M, for 60 min), **2.** Control.

Caffeine, a known inhibitor of certain forms of cyclic nucleotide phosphodiesterases (the enzymes catalysing the conversion of cyclic AMP to 5′-AMP) elevate the concentration of cyclic AMP[6]. In the present experiment it is assumed that caffeine elevates the cyclic AMP level in the salivary gland cells, which activate a specific group (heat shock) of puffs.

Oligomycin, a metabolic inhibitor, lowers the ATP level and did not induce any heat shock puffs. It was therefore suggested that cyclic AMP level elevation is involved in the induction of this special group of puffs[8]. Behnel[9,10] reported that chloramphenicol induced the heat shock puffs in *D. melanogaster* due probably to the suppression of cellular respiration and inhibition of protein synthesis. It is therefore likely that caffeine which increases the cyclic AMP level, also inhibits the respiratory chain reactions. The cumulative effect of both these processes seems to be involved in activating a specific group of puffs.

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NEWS

LAB TESTING IN THE PHYSICIAN'S OFFICE

. . . "Within the past three years, many group practices and individual physicians have purchased specialized chemistry analyzers and therapeutic drug monitoring instruments to perform laboratory procedures in their offices. The driving force behind office testing is two-fold: First, by measuring [chemical] concentrations in their offices, many physicians believe they can provide better care. Today's instruments allow physicians to perform diagnostic procedures while patients are present. On-site testing eliminates delays of hours, even days, for a hospital or commercial laboratory to provide results. Second, many physicians acquire equipment because they believe they can derive additional revenue without having to increase their patient workload at the same time. The growth of testing in physician's offices is forcing a major change in hospital laboratory medicine. If physicians can obtain accurate results in their offices in 10 to 15 minutes and use the results immediately, then hospitals should be able to do the same. For many kinds of tests, this capability is both necessary and economical. It saves time and enhances rapid achievement of therapeutic effect."

[(C. E. Pippenger & Robert S. Galen (Cleveland Clinic Foundation) in *Diagnostic Medicine* 8(1): 38-44, Jan 85). Reproduced with permission from Press Digest, *Current Contents*®, No. 15, April 15, 1985, p. 14. (Published by the Institute for Scientific Information®, Philadelphia, PA, USA.)]

HOW THE BRITISH FEEL ABOUT SCIENCE

. . . A poll done in Britain by Gallup, an opinion-research company, found that "the scientific community may be less popular than it might like to be because of concern over technology rather than worries about science itself. The overwhelming majority (83 %) of respondents agreed that scientific knowledge is good in itself: it is the way in which it is applied that creates problems. This opinion is shared by those who think science and technology do more good than harm and those who think they do more harm than good. There is no doubt, though, that people are aware of the potential dangers of scientific discoveries. Even among those who believe science to do more good than harm, 70 % accept that scientific discoveries can have dangerous effects. Respondents claiming that science can have very dangerous effects singled out nuclear energy as a high-risk area, with biotechnology and genetic engineering the second most mentioned. In view of this concern, it is perhaps not surprising that most (84 %) of those questioned felt that scientists and technologists should pay more attention to the social implications of their work. Concern about the interaction between science and society cuts both ways, though, with 76 % of respondents saying that politicians should know more about science."

[(Ros Herman & Michael Kenward in *New Scientist* 105(1444): 12-13, 21 Feb 85). Reproduced with permission from Press Digest, *Current Contents*®, No. 17, April 29, 1985, p. 7, (Published by the Institute for Scientific Information®, Philadelphia, PA, USA.)]