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Camel Urine as a Possible Anticarcinogenic Agent

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ABSTRACT. We offered c. tumours as a new experimental tool to find out if a substance has an anticarcinogenic effect or not. We find that camel urine inhibits the formation of c. tumours in *A. cepa* root tips that are formed after the treatment with colchicine, and we came to the conclusion that camel urine may inhibit the growth of cancer cells.

Camel urine (CU) is used in folklore medicine to treat cancer. The Beduine in the Arab desert used to mix camel urine with milk and give it to patients who were suffering from cancer as a morning drink. Milk was added to the urine only to overcome its strong odor. The urine must be fresh and excreted from young animals. The duration of the treatment lasts for a few weeks, after which the patients were declared to be healthy again. The treatment was effective especially in leukemia and digestive system cancer. The above mentioned claim awoke our interest to find out whether or not camel urine is an anticarcinogenic substance.

Materials and Methods

Fresh camel urine was sent to us through a special arrangement which enabled us to receive it in fresh condition and from young animals as it was used in folklore medicine for treating patients with cancer.

Bulbs of *Allium cepa* were allowed to germinate in tap water at 20°C. After the roots grew 2-4 cm, they were placed in the following solutions: camel urine (100%), 3 parts CU + 1 part H_2O (75%), 1 part CU + 1 part H_2O (50%) and 1 part CU + 3 parts H_2O (25%), for 24 and 48 hr.

A large number of roots were immersed in each of the test solutions and at least 20 root tips from each incubation were fixed. Scoring was made from a total number of 10 roots and at least 5000 cells were analysed from each concentration. The Feulgen squash method was used for preparing the slides for the examination of dividing cells and estimation of the mitotic index.

The paraffin method was used for preparing root tips which had been treated with colchicine (C), camel urine (CU) and C + CU for 3 days. Two parameters were considered in this investigation, namely, the nuceloplasmic index (NP) and the counting of the number of cell layers from the centre to the epidermal layer which was carried out in 10 different sections taken at random from the meristematic zone and the tumor zone in both treated and untreated roots.

Results

Mitotic Index

Camel urine caused complete growth inhibition when the meristematic cells of *A. cepa* were subjected to concentrations of 100%, 75% and 50% urine. Meristematic cells grown in water (control) showed normal growth, where the mitotic index reached 5.0791 (Table 1). The results of treating the meristematic cells of *A. cepa* with camel urine for 24 hr and 48 hr showed total inhibition of camel urine to cell division in the following concentrations: pure urine (100%), 75% urine + 25% H_2O, and 50% urine + 50% H_2O. However, exposure to a concentration of 25% urine + 75% water for 24 hr caused a decrease in the value of the dividing cells (2.3913) compared with the control in which the mitotic index reached 5.0791 (Table 1). Even this concentration of urine (25%) caused total inhibition for cell division after 48 hr (Table 1).

Table 1. M.I. after treatment with different concentrations of camel urine.

Concentration	24 hr	48 hr
100%	0.00	0.00
75%	0.00	0.00
50%	0.00	0.00
25%	2.3913	0.00
Control	5.0791	5.0791

Chromosome Assay

The lack of enough dividing cells after the application of CU in the above mentioned concentrations prevented chromosome assay. However, the very few dividing cells observed after exposure to 25% CU did not show any indication of chromosome damage. The inhibition of cell division might be the result of interference of camel urine with essential cellular components. This interference may have prevented the synthesis of DNA and proteins which leads consequently to a halt in the activity of the proliferating cells.

Induction of c-Tumours by Colchicine and the Role of Camel Urine in Controlling Tumour Formation

Figure 1 and Table 2 show the results of treating *A. cepa* root tips with colchicine for 3 days. It is clear that roots treated with colchicine developed the so-called c-tumours. Colchicine reduced the rate of root growth so much that they appeared stunted and thick compared with the untreated roots (control). Swelling in the roots appeared after 3 days of colchicine treatment.

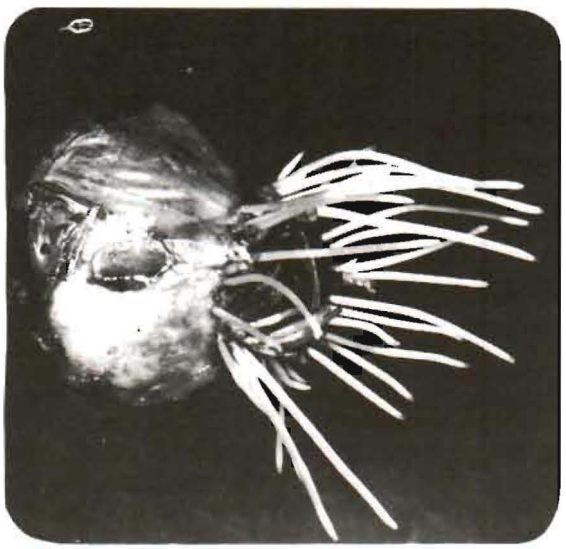
Microscopic observation on sections of the root tips which had been treated with colchicine showed that the enlargement included both the meristematic and the tumour zones. However, the main swelling area involved the elongation zone of the root. The increase in diameter was found to be due to the abnormal cell enlargement of the cortex area. This enlargement was evident from measurements of the surface area of sections of the different zones. The meristematic zone of roots treated with colchicine had an average area of 122.7818 compared with the untreated roots of the same zone which had an area of 22.9125 (Table 2). This area had increased more than five times in the tumor zone.

Table 2. Values of N/P ratio and Number of cell layers in transverse section of the same region in *A. cepa* root tips after the treatment with the following agents: a) water (control). b) Colchicine. c) Camel urine. d) Camel urine + Colchicine.

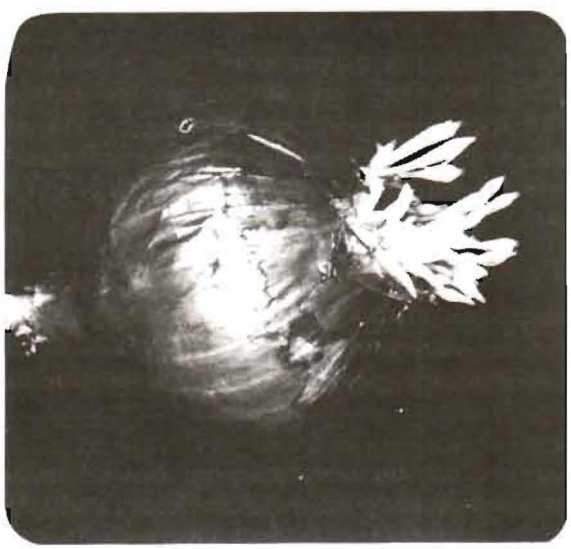
	Mean area of the cell by U_2	Mean area of the nucleus by U_2	N/P	Mean area of section by U_2	No. of layers from center to piliferous layer
Control	0.1048	0.0235	0.2904	22.9125	20
Colchicine	0.8083	0.0409	0.05333	122.9818	16
Urine + Col.	0.1174	0.0129	0.1240	34.8191	12
Urine	0.0735	0.0068	0.1022	28.5667	17

Hence, the increase in surface section area which causes abnormal swelling of the root to form a tumour was found to be due to cell enlargement of the cortex and pith layers rather than to an increase in cell number. This was proved by the determination of the number of cell layers from the centre to the peripheral layer. It is clear from Table 2 that there is no difference between the untreated roots and those treated with colchicine (20 and 16 layers respectively). Thus, it could be concluded that the tumour was due to cell enlargement. *A. cepa* root tips subjected to camel urine for 3 days did not induce c-tumours (Fig. 1 and 2). The most

A)



B)



interesting of these experiments resulted from subjecting *A. cepa* root tips to both camel urine and colchicine together in the ratio of 1:1; no c-tumours developed. This means that camel urine inhibits the formation of tumours caused by colchicine (Fig. 1 and 2).

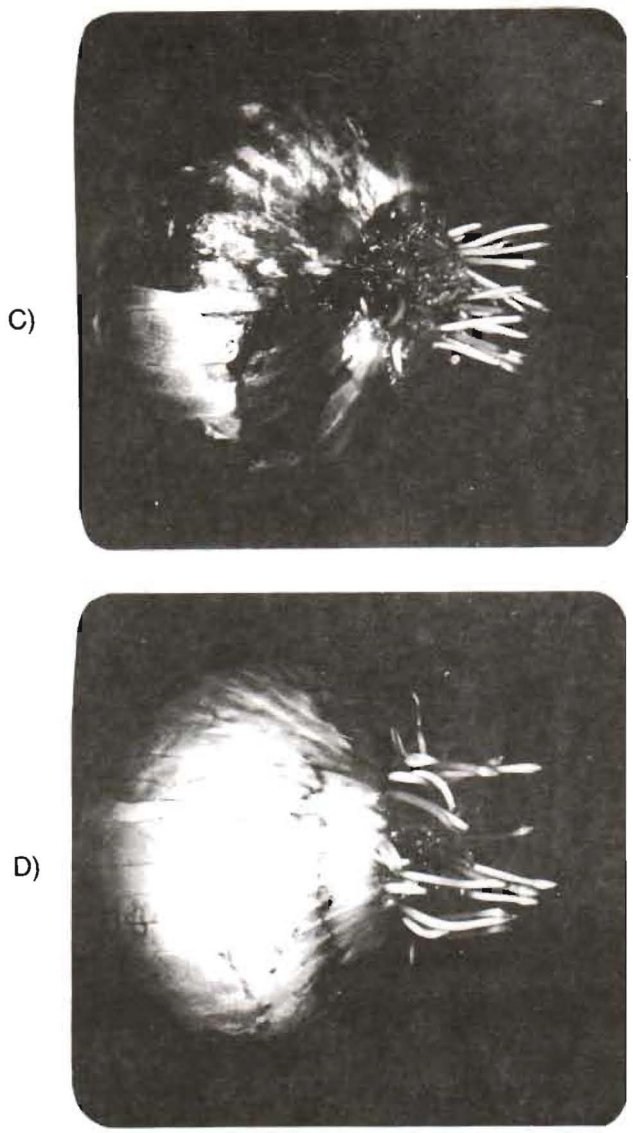


Fig. 1. *A. cepa* root tips after treatment with the following agents for 3 days.
a) water (control).
b) colchicine
c) camel urine
d) camel urine + colchicine 1:1.

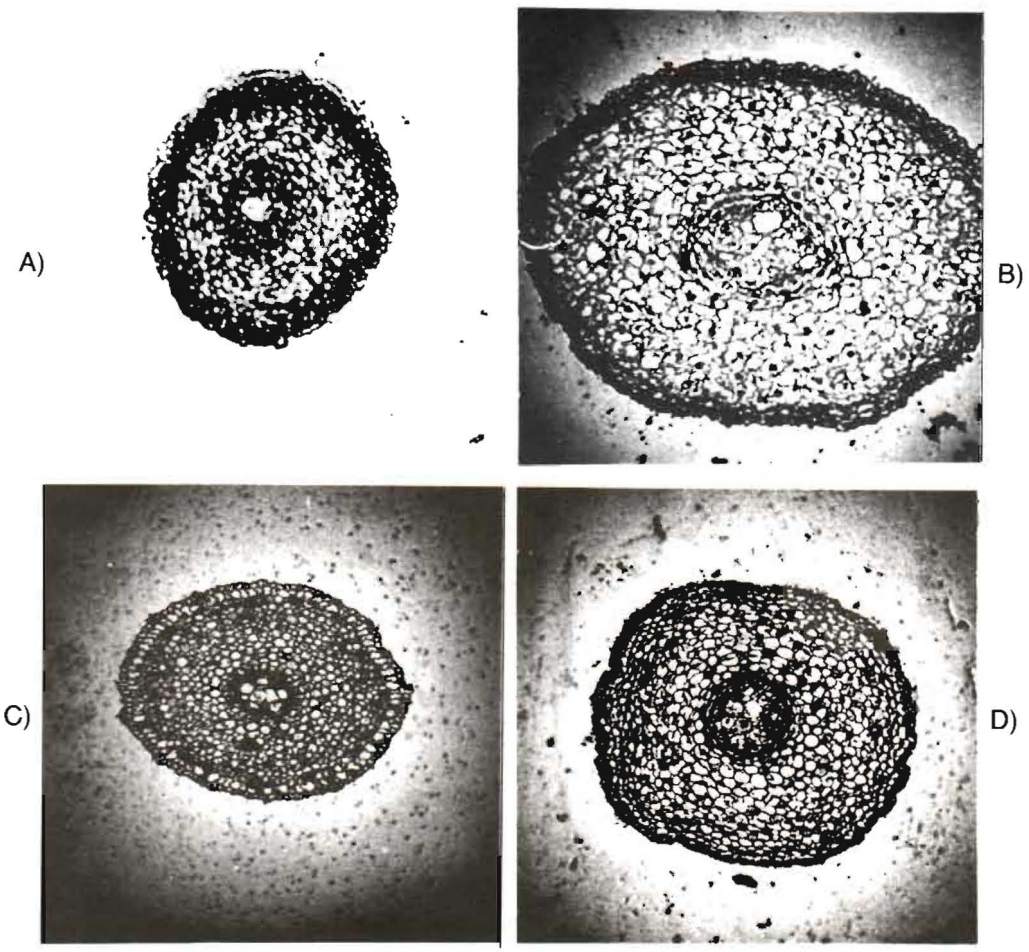


Fig. 2. T.S. in *A. cepa* root tips (the same region in all cases after treatment with the following agents for 3 days.
a) water (control).
b) colchicine
c) camel urine
d) camel urine + colchicine 1:1.

Discussion

C-Tumour - a Benign Type - Its Use as an Experimental Tool

C-tumours were formed in root tips of *A. cepa* due to treatment with colchicine. The main reason for these swellings in the roots is the abnormal enlargement of the region between the meristematic area and the differentiated cells of a root. Normally cells elongate linearly to the axis of the root. They seem to show a polarity in this respect but when colchicine is present, an enlargement of the cell takes place in all directions. This is an isodiametric expansion, rather than a polarized elongation. Cells of the cortex and pith become inflated. This leads to a swelling at a particular place along the root. Sections of treated and untreated roots within five or six layers of cells showed where the change occurred and revealed particularly the difference in shape of individual cells. These studies confirm the opinion that the direction of growth is altered when colchicine is present. The same result was found by Eigsti and Dustin (1955). Levan (1942) and Berger and Witkus (1949) found that growth promoting substances, such as naphthalene, acetic acid and indol-butyric acid, induce c-tumours. Rash (1964) stated that there was no evidence of non-chromosomal DNA in c-tumour cell. DNA synthesis extends over 50-60% of the interphase period in both normal and tumours Bean tissues.

Not all compounds that induce c-tumours arrest mitosis. In fact certain phytohormones that do not stop mitosis may induce root tip enlargements. The idea of independence of c-mitosis and c-tumours is supported by observations with several chemicals (Levan and Ostergren 1943).

Generally favourable conditions for growth promote the occurrence of a tumour induced a specific chemical treatment (Levan and Steingger 1947). The range in concentration of the chemical is fairly broad, but there are limits marked by minimum and maximum concentrations. The formation of c-tumours within certain limits is proportional to the concentration. Finally, the thresholds for c-mitosis and c-tumours are close to each other with some indication that the threshold for the latter process is lower than that of c-mitosis (Levan and Ostergren 1943).

As soon as the independence of c-mitosis and c-tumour was suspected, a specific experiment was designed to test autonomy (Levan 1942). Root primordia of *A. fistulosum* were subjected to intense X-ray treatment. Consequently, the mitotic capacity of meristematic cells was destroyed. Following X-irradiation, the bulbs were placed in colchicine, and typical c-tumours formed with no evidence of mitosis in these roots after several days. Therefore, enlargement occurs without a simultaneous division of cells. Polyploidy following c-mitosis is not necessary for tumour formation. Swelling at the hypocotyl where seedlings were soaked in colchicine gave the first evidence that tumours were in no way related to c-mitosis

or induced polyploidy. Although cells in the hypocotyl are not meristematic, they are capable of elongating or expanding.

For all the above mentioned facts, we consider c-tumours as a bengin type of tumour which can be used as an experimental tool to find out if a certain chemical has an anticarcingenic effect or not.

Camel urine was found to inhibit the formation of c-tumours induced in *A. cepa* root cells after long treatment with colchicine. This means that certain chemical substances in camel urine interacted with colchicine which allowed *A. cepa* root cells to grow normally. These results are an indication that certain chemical(s) found in camel urine may inhibit the growth of tumours. In this respect, we feel that further studies on other tissues, *e.g.* human and other mammalian cells (mice), are essential to confirm these results. To this end we are planning to carry out these investigations in the near future. Further, we are trying to separate the chemical components of camel urine to investigate their effects separately. We hope, in this way that we will be able to identify a definite chemical component which will help in cancer treatment.

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بول الجمال كمادة مضادة للسرطان

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يُتداول بول الجمال الفتية في الطب الشعبي البدوي ممزوجا بالحليب لعلاج الكثير من أنواع السرطان ويعطى للمريض المصاب بالسرطان على هيئة مشروب صباحي، ويضاف الحليب فقط إليه للتغلب على الرائحة النفاذة للبول. ويستغرق العلاج بضع أسابيع بعدها تتحسن الحالة وربما تشفى تماما. وبول الجمال يعتبر ناجحا خاصة في حالات سرطان الدم والجهاز التنفسي.

وقد أثار هذه الإدعاء اهتمامنا من الناحية العلمية، وقررنا أن نقوم بهذا البحث لتبيان صحة هذا الادعاء من عدمه. وقد قدّم الباحثون نوعاً جديداً من الأورام الحميدة التي تحدث في جذور النباتات بواسطة مادة اللحلاحين كأداة للكشف عن أثر المواد المضادة للسرطان. وهذا في حدّ ذاته يعتبر إضافة علمية جديدة في هذا المجال.

وبالتأثير على هذه الأورام ببول الجمال توقف نمو هذه الأورام ولذا توصلنا ـ مبدئياً ـ للقول أن بول الجمال ربما يوقف نمو الخلايا السرطانية.

وفي هذا الصدد مازال هناك الكثير الذي يجب إجراؤه ـ مثل إعادة هذه التجارب على خلايا أخرى (مثل خلايا الإنسان وحيوانات التجارب) ـ كما أننا نعتزم بجانب إجراء هذه التجارب فصل المكونات الكيميائية لبول الجمال، ودراسة أثر كل منها على حده، حتى يمكننا في النهاية التقدم بمادة كيميائية محددة تكون لها فاعلية القضاء على السرطان.