

SCIENTIFIC SECTION

FURTHER OBSERVATIONS ON THE ANTI-DIABETIC PROPERTIES OF TECOMA MOLLIS.

BY G. G. COLIN.*

In a previous paper¹ we informed about some observations of the effect of *Tecoma mollis* extracts when applied to the diabetic patient. The insulin-like action could not be properly controlled due to lack of facilities regarding diet and apparatus.

The present observations deal with the oral administration of these extracts as observed by prominent medical men in years gone by, as well as with the effects in cases under our control.

Back in 1899, at the Instituto Medico Nacional, this investigation was undertaken. Infusions of *Tecoma mollis* were applied hypodermically to dogs, using progressive concentrations up to a volume representing the active extractives of 8 Gm. of material (volume of extract not stated), without untoward effects. Doves were also used in these tests and were given as much as 40 Gm. of extract. With high doses vomiting and diarrhea followed, effects which showed consistently with the administration of 10 Gm. and up. With less than 10 Gm. no undesirable effects followed.

After several trials with animals with artificial diabetes (phlorizin) it was concluded that the drug had no effect under those conditions. The following conclusions were reached:

1. The drug is not toxic to animals.
2. It may be used over long periods of time without harmful effects, in man.
3. Anti-diabetic action is not apparent in artificial diabetes (phlorizin).
4. As a general tonic it may occupy a prominent place in national therapeutics.
5. Although its action has not been well defined, its effects are well proven.

Mr. L. L., intimately known by the investigating physicians of the Instituto Medico Nacional, used this drug, alternating it with other anti-diabetic preparations and congratulates himself because of its use.

Dr. Aleman gives the following data about himself, a diabetic:

"Without causing the disappearance of diabetic symptoms, my health is good, thirst is diminished considerably. The drug has a decidedly beneficial effect in digestive disturbances."

Drs. Terres and Bulman report on three cases as follows:

Case I.—A case of pancreatic diabetes. Twenty-four hour output of urine was 2095 cc. with 7 per cent glucose. An infusion representing 100 Gm. of the drug given daily gave negative results.

Case II.—In this case glucose fell from 2.5 per cent to 1.2 per cent. Urea diminished from 26 to 21 Gm. and with the continued use of 5 Gm. of drug daily a very decided general improvement was observed.

Case III.—No data given, only a negative result is reported. Dr. Armendaris reports the following case:

In 1901, Dr. M. took an infusion of *Tecoma mollis*, in September. With the daily use of the infusion and at the end of 23 days glucose had fallen from 3.6 per cent to 2.2 per cent and at

* Central Chemical Laboratory, Mexico. ¹ JOUR. A. PH. A., p. 556 (July 1926).

the same time his general condition had improved noticeably, in spite of the fact that he had not followed a strict diet.

Dr. Cicero reports:

A gouty diabetic, female, with 1750 cc. urine and 4.1 per cent glucose improved to 1200 cc. urine with 0.6 per cent glucose. (Dose of drug and length of time used not stated.)

It will be noticed that of the seven cases reported, two showed no improvement, while the other five were benefited by the administration of the drug. It is unfortunate that the data given are not very precise for the factors' time, dosage, diet, blood sugar, weight, etc., are not as accurately stated as would be desirable in order to be able to draw more or less definite conclusions.

In our previous report, we observed a hypoglycemic effect with the hypodermic administration of the extract to the diabetic patient, but had no definite data regarding the effects of its oral administration.

The two cases under our control and observation over a period of about six months, at the Hospital de Jesus, showed improvement. Patient E-9 died of pneumonia while we had her under observation, having withdrawn the treatment in order to obtain some data about her condition when subjected to a dietetic treatment without drugs. Patient E-12 left the Hospital improved.

Outside patients who were taking the treatment expressed the following effects observed on themselves with the oral administration of the extract in the form of drops. The dose varied from 25 drops before meals, 3 times daily, to 50 drops. The results were as follows:

1. In all cases thirst was diminished and consequently the 24-hour volume of urine decreased.
2. In no case did the decrease in volume of urine correspond to a proportionate rise in glucose concentration, dietetic factors remaining constant.
3. Some patients stated that they had felt aphrodisiac effects (stimulation or sexual desire). These patients were over 60 years of age, male.
4. A remarkable increase in appetite was manifested by several patients (the extract has an intensely bitter taste). One patient who had been under insulin treatment previously refused to continue the treatment, because the increase in appetite interfered with his dietetic habits. This effect is not permanent. It is felt only during 3 or 4 days, at the beginning of the treatment.
5. It was impossible to state in definite percentages the number of those benefited and of the negative cases. Outside patients usually discontinue the treatment at the first signs of improvement.
6. Our observations agree with those of the other investigators mentioned in cases wherein, although the glucosuria persists, the general health of the patient is improved.
7. In a number of cases the results were absolutely negative, in every respect.

The results of the urine analyses of the two patients under our control, E-9 and E-12, were the following:

TABLE I.—PATIENT E-9.
24-hour volume.

No.	Date.	Urine.	Per cent sugar.	Gm. sugar.	Diacetic acid.
1	1/18/26	3,900 cc.	6.66	260.00	none
2	2/ 1/26	4,000 cc.	6.75	270.00	none
3	8/26	4,680 cc.	6.25	292.00	none
4	15/26	3,600 cc.	6.67	240.00	none
5	19/26	4,220 cc.	7.50	316.00	none
6	22/26	3,640 cc.	9.50	345.80	none
7	26/26	4,000 cc.	7.50	300.00	none

8	3/ 1/26	2,830 cc.	8.18	233.00	none
9	6/26	3,700 cc.	8.18	302.70	none
10	8/26	3,000 cc.	7.30	219.00	none
11	13/26	3,600 cc.	7.65	273.20	none
12	15/26	3,820 cc.	3.30	126.06	none
13	19/26	3,800 cc.	8.11	308.20	none
14	22/26	3,680 cc.	8.11	298.00	none
15	4/ 1/26	1,500 cc.	5.26	78.94	none
16	5/26	2,600 cc.	7.04	183.10	none
17	19/26	3,200 cc.	7.25	232.00	none
18	26/26	3,800 cc.	6.58	250.00	none
19	5/ 3/26	3,440 cc.	5.88	202.30	none
20	7/26	3,460 cc.	5.10	176.50	none
21	13/26	4,000 cc.	....	.....	....
22	19/26	2,650 cc.	6.85	181.52	none
23	22/26	2,000 cc.	6.66	133.32	none
24	28/26	3,420 cc.	6.67	228.11	none
25	31/26	2,800 cc.	7.69	215.38	none
26	6/ 7/26	2,840 cc.	6.84	194.54	none
27	12/26	3,000 cc.	5.88	176.46	none
28	19/26	2,600 cc.	5.68	152.93	none
29	21/26	1,680 cc.	6.67	95.46	none
30	24/26	1,800 cc.	....	120.00	none

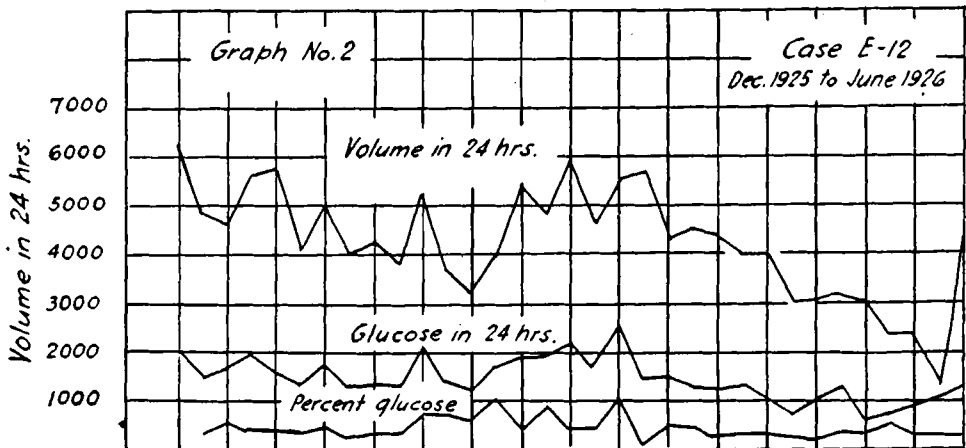
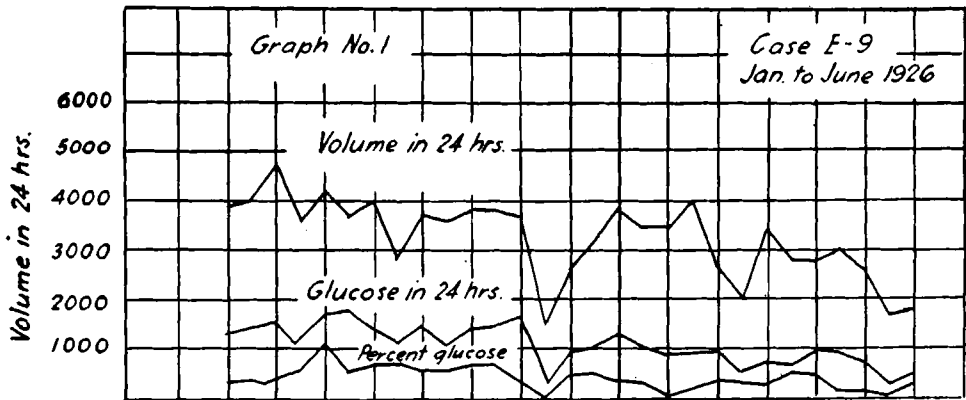


TABLE II.—PATIENT E-12.

No.	Date.	24-hour volume.		Gm. sugar.	Diacetic acid.
		Urine.	Per cent sugar.		
1	12/ 7/25	6,200 cc.	6.67	406.90	xxxxx
2	14/25	4,840 cc.	6.41	310.24	xxxxx
3	21/25	4,600 cc.	7.69	353.78	xxxxx
4	28/25	5,600 cc.	7.14	399.84	xxx
5	1/11/26	5,750 cc.	....	.....	....
6	18/26	4,100 cc.	6.67	297.08	xxxxx
7	2/ 1/26	5,000 cc.	7.24	362.30	xxxxx
8	8/26	4,000 cc.	6.25	250.00	xxxxx
9	15/26	4,200 cc.	6.88	289.30	xxxx
10	19/26	3,800 cc.	6.92	253.07	xxxx
11	22/26	5,220 cc.	8.40	420.28	xx
12	26/26	3,624 cc.	8.36	291.21	none
13	3/ 1/26	3,240 cc.	8.18	265.64	xxxxx
14	6/26	3,900 cc.	9.37	365.60	xxxxx
15	8/26	5,400 cc.	7.00	378.00	xxxxx
16	13/26	4,800 cc.	8.11	389.33	xxx
17	15/26	5,960 cc.	7.30	435.08	xxx
18	19/26	4,624 cc.	7.30	337.00	xxxxx
19	22/26	5,580 cc.	9.10	502.00	xxxx
20	4/ 1/26	5,640 cc.	5.55	313.30	xx
21	5/26	4,240 cc.	7.14	302.72	none
22	19/26	4,500 cc.	7.04	316.80	xxxxx
23	26/26	4,420 cc.	6.15	272.00	xxxxx
24	5/ 3/26	4,000 cc.	6.67	266.64	xxxxx
25	7/26	4,000 cc.	6.85	274.00	xx
26	17/26	3,000 cc.	....	.....	....
27	20/26	3,050 cc.	5.95	181.50	x
28	22/26	3,180 cc.	6.66	211.97	x
29	24/26	3,080 cc.	6.67	258.80	none
30	28/26	2,200 cc.	7.69	168.63	xxxxx
31	31/26	2,780 cc.	6.67	185.31	xxxxx
32	6/ 7/26	1,250 cc.	6.67	.....	xxxxx
33	19/26	4,440 cc.	6.25	277.00	xxxxx
34	21/26	2,880 cc.	6.85	120.00	xxxxx

Both patients E-9 and E-12 were started with the extract taking 25 drops before meals, 3 times daily. The dose was increased gradually until they were taking 50 drops 3 times a day. It will be noticed that the volume of urine diminished towards the end of the experiment. With a reduction of almost 50 per cent, the concentration of glucose remains practically the same as with a volume of 6.2 liters, the diet being the same. We were unable to account for the disappearance of diacetic acid in three analyses. In both cases the extract was also applied hypodermically in 1-3-cc. doses to determine its effect on blood sugar, as reported previously.

There appears to be a reason for the popularity of this drug among the laity. The observations made at the Instituto Medico Nacional added to our own seem to give evidence of the therapeutic properties. It must not be believed, however, that with the present knowledge of the physiological action of this drug, it can be matched against insulin.

In a general way it may be stated that although the use of *Tecoma mollis*

benefits some types of diabetic patients, it has not been defined what types of diabetes it is best suited for.

The fact that some old patients have felt aphrodisiac stimulation may point out its properties as a general tonic.

It has been believed that *Tecoma mollis* is a diuretic, but facts seem to point to the contrary. Its action is anti-diuretic and we venture to suppose that there may be a possible stimulation to pituitary secretion by the use of the extract.

We have planned experiments to determine the action of the essential oil from the plant as well as to investigate the action of a fraction of proteins or proteoses which can be precipitated from the extract, freed from gums and resins by half saturation with ammonium sulphate.

REFERENCES.

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THE POTENCY OF VARIOUS SAMPLES OF DIGITALIS GROWN IN BRITISH COLUMBIA.

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The wild variety of digitalis has been known for some time to exist in fair abundance throughout the southern parts of the province of British Columbia, Canada. Indeed, the climatic and soil conditions of this district seem very well suited to the flourishing, but uncultivated, growth of this plant. In a report by Dauphinee (3), in 1924, which is referred to more fully below, it was shown that the digitalis content of these wild plants (kept under cultivation for one year) was quite comparable with that of leaves grown in England, Germany and the United States. With these facts in mind an attempt has recently been made to keep these plants under cultivation for commercial purposes; indeed the practicability of growing these plants has been demonstrated.

In the Spring of this year, Prof. V. E. Henderson, while on a tour through the Western Provinces visited and became interested in the work which was being done at this digitalis farm. Since no definite investigation of the potency of these cultivated plants had been made it was deemed advisable that an assay of these plants should be carried out in order to observe how they compared with those hitherto obtained from foreign markets.

On this farm, in addition to the usual *Digitalis purpurea* L. with purple blooms, there were also *Digitalis purpurea* with white blooms, and the botanically distinct species *Digitalis lutea* L. The relative number of plants with white blooms was quite large; if these were of inferior glucosidal content it would materially affect the average quality of the leaf, so samples of leaves from plants having white blooms were also assayed. The potency of *Digitalis lutea* leaves was also determined, as references in the literature to this species are very few. While on