A SYNTHESIS OF α-TERTHIENYL-METHANOL, A COMPONENT OF *ECLIPTA ALBA*

RECENTLY we reported[1] the isolation of a new polythienyl alcohol from the leaves of *Eclipta alba* and its characterisation as α-terthienyl-methanol. Its structure has now been confirmed by synthesis.

A mixture of α-terthienyl (100 mg.) prepared according to the method of Sease and Zechmeister,[2] dimethylformamide (40 mg.) and phosphorus oxychloride (60 mg.) was heated at 100° for 10 min., cooled, and after 2 hr. heated with aqueous sodium acetate (120 mg. in 2 ml.) on a boiling water-bath for ½ hr. The product (100 mg.) was a mixture (TLC) of two compounds both of which were different from the starting material. It was dissolved in benzene and chromatographed over silica gel and developed with benzene. The first 60 ml. of the eluate yielded 2-formyl-α-terthienyl (40 mg.) which separated from benzene as yellow glistening needles, m.p. 130–132°, $\lambda_{max.}^{MeOH}$ (Qual.) 239, 266 and 394 mμ. (Found: C, 56·5; H, 3·2. $C_{13}H_8OS_3$ requires C, 56·5; H, 2·9%.) Takano *et al.*[3] who prepared this aldehyde by the same reaction reported a m.p. 134°. Subsequent benzene eluate, exhibiting marked green fluorescence, yielded an orange compound (10 mg.) which crystallised from benzene as needles, m.p. 215–218°, $\lambda_{max.}^{MeOH}$ (Qual.) 250, 276 and 406 mμ. (Found: C, 55·4; H, 2·7. $C_{14}H_8O_2S_3$, 2, 5″-diformyl-α-terthienyl, requires C, 55·3; H, 2·6%.) A solution of 2-formyl-α-terthienyl (10 mg.) in ethanol (40 ml.) was treated with aqueous $NaBH_4$ (10 mg. in 1 ml.) and the mixture allowed to stand for 8 hr. The solvent was distilled off under reduced pressure and the residue extracted with ether. The ether solution yielded α-terthienylmethanol which crystallised from benzene as lemon yellow plates, m.p. 150–151° (uncorrected), identical with that of the natural sample. Its UV and IR spectra were indistinguishable from those of the natural sample.

We thank Dr. B. D. Tilak for a generous gift of thiophene.

Dept. of Chemistry, N. R. KRISHNASWAMY.
University of Delhi, T. R. SESHADRI.
Delhi-7, *August* 10, 1966. B. R. SHARMA.

1. Krishnaswamy, N. R., Seshadri, T. R. and Sharma, B. R., *Tetrahedron Letters*, 1966, No. 35, 4227.
2. Sease, J. W. and Zechmeister, L., *J. Amer. Chem. Soc.*, 1947, **69**, 270.
3. Takano, T., Iwata, T., Atarshi, S. and Okada, S., *Japan J. Pharm. Chem.*, 1965, **36**, 22.

THE INFLUENCE OF THE SUBMANDIBULAR SALIVARY GLAND ON GROWTH

(Preliminary Communication)

THE submandibular salivary gland, one of the three major salivary glands in humans and other mammals, is only known to be a pure exocrine gland with the prime and only function of secreting saliva.[1] The structure is known to be of the mucoserous type.[2,3] Our experiments indicate that beside its exocrine function, it has certain other actions which are endocrinoid in nature; namely the control of growth.

The preliminary studies were done on 100 Swiss albino mice (8-9 days old), 20 Swiss albino rats (11-12 days old) and a few cats, dogs and monkeys (*Macaca radiata* Linn.). The animals were selected and distributed in such a way that in all cases except the monkeys the control and the experimental group were litter-mates belonging to the same sex.

The batches of animals were divided into three groups; in the experimental group, the submandibular salivary glands were surgically removed at operation, using a small horizontal incision in the mid-ventral line of the neck, close to the symphysis menti. Anæsthetic ether puris was used as the anæsthetic in the case of the rodents, by the open drop method; and Thiopental sodium BP (parenteral) was used in the case of other animals (25–30 mg./kg. body weight). In the first control group, a similar incision was made to ligate the ducts of the glands at the hilus; without disturbing the adjoining structures. In the second control group no operation was done at all. The control animals received the identical amount of food (B. J. M. C. labs. nutrional diet 102) and water that was consumed by the experimentals.

The controls (both the non-operated and the duct-ligated animals) were completely normal and showed a normal growth pattern. However, the animals which had undergone bilateral submandibularectomy showed a marked reduction both in the rate and degree of growth; being nearly half the weight of the controls. The milestones of growth appeared at a slower rate. They were healthy but were stunted in growth and were physical dwarfs. Our results were consistent in all the cases. The difference in the sizes of the experimentals and the controls was similar to the picture of hypophysectomy. The earliest work on this was by Plagge in 1938[4] who stressed the importance of the salivary glands to the newborn rats which died when they were removed, but ascribed his findings to the loss of salivary secretion.

That the retardation of growth is not due to the loss of salivary secretion is proved by the fact that ligation of the duct of the submandibular gland with a consequent blockade of the secretion of saliva and a resultant pressure atrophy of the exocrine cells, produces no change in the growth pattern, while it is the bilateral ablation of the gland, involving the loss of some 'internal secretion or factor' which causes this retardation of growth resulting in dwarfism. Since litter-mates were chosen the genetical factor was controlled to the maximum. That this phenomenon is not due to any nutritional or dietetic variance is proved by the fact that the controls were given the identical amount of the same food as was consumed by the experimentals; nor is it due to the trauma of the operation, with resultant traumatic dysphagia, because the operation for the ligation of the ducts involves the same amount of tissue injury, yet the growth of the duct-ligated controls was normal. This necessarily indicates the presence of some internal endocrine-like factor secreted by the submandibular salivary gland which influences growth. While further work is in progress to isolate the active principle involved, this paper has been put forth as a preliminary communication.

We are grateful to Dr. F. J. Mendonca, Dean, B. Medical College and Sassoon Hospitals, for his kind encouragement during the course of the work.

B.J. Medical College and Sassoon General Hospitals, Poona, *May* 3, 1966.

M. J. NARASIMHAN (JR.).
V. G. GANLA.

1. Burgen, A. S. V. and Emmelin, N. G., *Physiology of the Salivary Glands*, Edward Arnold (Publishers) Ltd., Lordon, 1961.
2. Szymanska, Z., *Acta Theriologica*, 1963, **7** (3), 25.
3. — and Zofia, *Folia Morphol.*, 1962, **13** (2), 195.
4. Plagge J. C., *Am. J. Physiol*, 1938, **124** (3), 612.

EFFECT OF A FOREIGN BODY ON OXYGEN CONSUMPTION OF THE RAT UTERUS

It has been reported previously that an intrauterine foreign body (IUFB) causes a progressive increase in oxygen consumption of the rat uterus.[1] A similnr rise in oxygen uptake of the rhesus monkeys uterus has been noted after the insertion of a plastic contraceptive coil (Margulies spiral); at 90 days post-insertion the increase is about 21%, but after 545 days the oxygen consumption of the organ is normalized.[2,3] Evidently, the pattern of change in oxygen uptake of the uterus provoked by a foreign body is different in the two species. Accordingly, it has been considered worthwhile to examine the oxygen consumption of the rat uterus after prolonged residence of an IUFB.

Colony-bred adult albino rats (150–170 gm.) of the Institute were used in this investigation. A surgical silk suture was inserted through the antimesometrial wall of the right uterine horn under ether anæsthesia according to the procedure described previously.[1] The two ends of the suture were tied in a knot with sufficient margin to permit free movement of the uterus. The needle was passed in an identical manner through the contralateral horn without leaving a suture in place. All operations were done under aseptic precautions. The animals were maintained in airconditioned quarters (temperature: $75 \pm 2°$ F.) under uniform husbandry conditions throughout the experimental period.

The rats were sacrificed 25, 200 and 400 days after insertion of the suture. In order to eliminate variations due to the estrus cycle this investigation was carried out only at estrus. The oxygen uptake (QO_2) was measured in thin slices (80–100 μ) of uterine tissue by the procedure of Umbreit *et al.*[4]

It will be evident from the results presented in Table I that 25 days after insertion of the foreign body the oxygen consumption of the treated horn was 22·7% higher than that of the control horn. This value was as high as 100·9% at 200 days post-insertion, but at 400 days it was relatively less being 58·4% higher than that of the control horn.

TABLE I

The oxygen consumption of the rat uterus in the presence of a foreign body

Days after introduction of the intrauterine foreign body	Oxygen consumption (QO_2) Control horn	Treated horn	Increase %
25*	12·80 (*3*)† (10·10–14·03)	15·70 (*3*) (13·33–16·16)‡	22·7
200*	10·60 (*3*) (8·30–12·80)	21·30 (*3*) (19·70–33·90)	100·9
400	11·30 (*15*) (11·00–11·30)	17·90 (*15*) (16·90–18·90)	58·4

* Data from Kar *et. al.*[1] † No. of uterine horns.
‡ Mean with range in parenthesis.

The results of the present study show that an IUFB causes a progressive increase in oxygen consumption of the rat uterus for a period of time followed by a relative decline. On the basis of detailed biochemical investigation it has been suggested that such increase in oxygen uptake denotes a trauma to the uterine tissue.[3]