## Formation of γ-Guanidinobutyric Acid in Pine Tissues

In several experiments in which arginine uniformly labelled with carbon-14 was fed to various tissues of pines, one unidentified compound was found to contain most of the radioactivity incorporated into alcohol-soluble products. When tissue extracts were cleared for chromatography following the ion-exchange procedure of Plaisted[1], the unknown was eluted from 'Dowex 50' resin with the acidic and neutral amino-acids. However, the $R_F$ of the unidentified compound on paper chromatography did not correspond with the $R_F$ of any common amino-acid. Subsequent tests indicated that the radioactive unknown was γ-guanidinobutyric acid, previously found in several species of higher plants, as well as in insects and mammals, by Irreverre *et al.*[2].

Evidence for the identification of the unknown from pine tissues is as follows:

(1) The compound was chromatographically identical with authentic γ-guanidinobutyric acid in four solvent systems (Table 1).

Table 1. $R_F$ VALUES OF KNOWN AND UNKNOWN γ-GUANIDINOBUTYRIC ACID

| Solvent | $R_F$ |
|---|---|
| Ethanol/ammonia/water (18 : 1 : 1) | 0·23 |
| *n*-Butanol/propionic acid/water (ref. 3) | 0·48 |
| Ethyl acetate/acetic acid/water (3 : 1 : 1) | 0·57 |
| Phenol/water (71 : 29, w/v) | 0·90 |

(2) The compound was electrophoretically indistinguishable from authentic γ-guanidinobutyric acid in buffers of *p*H 2·7, 4·0, 5·9, 8·6, and 11·5.

(3) Hydrolysis of the unknown with barium hydroxide, essentially as described by Rivard and Carter[4], yielded radioactive carbon dioxide (as barium carbonate) and a second radioactive compound which was chromatographically and electrophoretically identical with γ-aminobutyric acid.

In four typical experiments in which uniformly labelled arginine was fed to pine tissues, the proportions of total radioactivity of the acidic and neutral amino-acid fractions appearing in γ-guanidinobutyric acid ranged from 64 to 91 per cent (Table 2).

Table 2. RADIOACTIVITY IN γ-GUANIDINOBUTYRIC ACID FORMED IN PINE TISSUES FED UNIFORMLY LABELLED ARGININE FOR 24 HR.

| Tissue and species | Radioactivity in γ-guanidinobutyric acid as per cent of total in acidic and neutral amino-acid fraction |
|---|---|
| Female flowers, *Pinus taeda* L. | 64 |
| Callus tissue, *P. clausa* (Chapm.) Vasey | 71 |
| Callus tissue, *P. elliottii* Englm. | 79 |
| Isolated roots, *P. serotina* Michx. | 91 |

The apparent route of formation of γ-guanidinobutyric acid was the oxidative pathway via α-keto-δ-guanidino-valeric acid. Such a pathway has been reported in marine invertebrates[5], although apparently not in higher plants. The radioactive products of barium hydroxide hydrolysis of the γ-guanidinobutyric acid found in pine tissue extracts were consistent with the operation of the oxidative pathway. A second possible pathway of γ-guanidinobutyric acid synthesis is the transamidination reaction between arginine and γ-aminobutyric acid, known to take place in some mammalian tissues[6]. In a short-time experiment, using uniformly labelled arginine, operation of the latter pathway should lead to radioactive labelling in only the guanidine carbon of γ-guanidinobutyric acid; whereas, in the experiments reported here, the γ-aminobutyric acid moiety was also labelled. Since 24-hr. feeding periods were used, the possibility of the operation of the transamidination pathway has not been eliminated. However, the labelling patterns in the tissues were more consistent with the hypothesis of the oxidative pathway.

Further experiments to determine the pathways of γ-guanidinobutyric acid biosynthesis and utilization in pine tissues are in progress. Regardless of predominant pathways, however, the large amount of arginine converted to γ-guanidinobutyric acid in pine tissues is of considerable interest.

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# PHYSIOLOGY

## *In vitro* Effects of Prostaglandin on Different Parts of the Human Fallopian Tube

The occurrence, formation and some biological actions of prostaglandin have previously been examined[1–3]. However, no work on the effect on the human Fallopian tube has so far been published.

Using a modified Magnus Kehrer technique[4], we have investigated the action of prostaglandin on the longitudinal musculature from the excised human Fallopian tube. The tube was divided into four parts of equal length, the proximal one being named segment 1 and the most distal one segment 4. For estimation of effects six parameters were considered and statistically analysed (Student's *t* test)[4]. Prostaglandin, purified according to Eliasson[1], was given in doses of 0·0025–0·025 unit[1]/ml.

The results obtained are summarized in Table 1. It is interesting that the proximal segment of the tube responds in a different way compared with the rest of the tube. Thus, prostaglandin exerts a stimulating

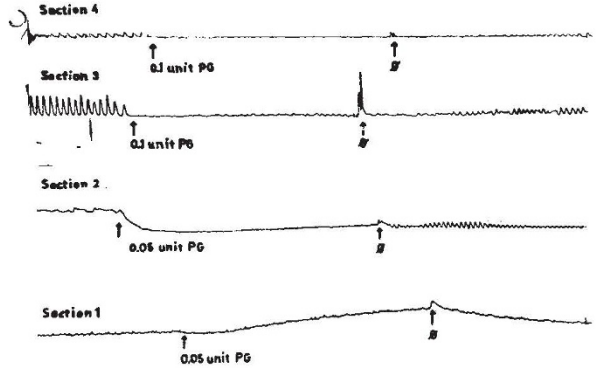


Fig. 1. Effect of prostaglandin on the longitudinal musculature from the four segments of the human Fallopian tube, segment 1 being the most proximal one and segment 4 the most distal one