Fig. 2. Changes of *D. ananassae* AP during development showing two electrophoretic types (a and b) in stages of development comparable to *D. melanogaster* in Fig. 1. Bands of minor staining intensity are not included. Female and male adults are included to show the reappearance of the larval zone in males.

charged sub-unit could be responsible in both species. If this is so, the return of the larval pattern in *D. ananassae* should be the result of reactivation of the synthesis of the sub-unit in males only. Changes in the molecule may not reflect changes in activity of the *Aph* structural locus. For example, chemical alteration such as changes in sialic acid content may result from differences in the chemical environment during the course of development and in adult males and females. This problem will be resolved when all the loci directly involved in AP structure and synthesis are known. A comparison of changes among various taxonomic groups of related species may prove valuable in the reconstruction of the complex phylogeny of *Drosophila*.

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Free Amino-acid Content in Needles of *Abies balsamea* and *Picea mariana* growing on Different Sites

THE abundance of tyrosine among the free amino-acids of ligneous plants of the lesser forest vegetation has been emphasized¹. Because this amino-acid may be significant in lignin synthesis and in resistance to frost², the present investigation was undertaken to test the relative abundance of tyrosine in the free amino-acids of the needles of balsam fir (*Abies balsamea* (L.)) and black spruce (*Picea mariana* (Mill.)), which grow in widely separated areas of the Quebec boreal forest region³.

Composite samples of needles grown in the current year were collected from the lower branches of trees growing

under various conditions. Collections were made during the day at the end of the growing season before frost. At each place the foliage was taken from ten dominant trees growing on two types of site (as assessed by ground vegetation patterns and site index). Black spruce growing on poor sites was sampled at two localities. Black spruce and balsam fir on good sites, and balsam fir on poor sites were each sampled in four localities, giving fourteen sampling areas.

Free amino-acids were extracted from dried tissues⁴ and separated by two-dimensional paper chromatography to determine possible differences in distribution among species and sites. Identification of amino-acids in extracts of the tissue was from chromatographic maps constructed using pure amino-acids and a tracer. The recovery of individual pure amino-acids averaged 87 per cent.

The results (Table 1) indicate an overall qualitative similarity in the free amino-acid pattern of the two tree species studied, but considerable variation in the amount of free amino-acid content is found between and within species, the latter being ascribed to differences in the conditions of growth.

Table 1. AMINO-ACIDS IN AN AQUEOUS EXTRACT OF DRIED NEEDLES OF BALSAM FIR AND BLACK SPRUCE GROWING ON TWO DIFFERENT SITES (mg/100 g dried tissues)

Species	<i>Abies balsamea</i> (L.) Mill.	<i>Picea mariana</i> (Mill.) BSP
Site type*	<i>Dryopteris-Oxalis</i>	<i>Hypnum-Sphagnum-Rubus</i>
Site index	45	37
No. of sampling areas	4	2
Amino-acid		
Alanine	41.2 ± 3.9†	25.2 ± 7.1
γ-Aminobutyric acid	22.1 ± 7.7	18.5 ± 4.0
Arginine	T to 1.3	T to 2.0
Asparagine	—	—
Aspartic acid	1.6 ± 1.2	T to 0.5
Cysteic acid	5.1 ± 5.7	T to 2.7
Glutamic acid	2.1 ± 0.6	T to 1.0
Glutamine	4.4 ± 1.9	T to 2.0
Glycine	2.5 ± 0.7	T to 1.6
Lysine	—	—
Methionine	T	T
Phenylalanine	T	T
Proline	2.0 ± 2.5	T to 1.0
Serine	61.4 ± 1.1	28.6 ± 4.9
Tyrosine	—	—

* Based on height of dominant and co-dominant fir and black spruce 50 years old.

† Expressed as means ± S.D.

—, Not detected.

T, Detected but too weak for determination.

The characteristic feature of the free amino-acids of freshly fallen balsam and spruce needles is the high concentration of alanine and tyrosine in both species, and of proline in black spruce. These concentrations are much greater than those obtained by Muir *et al.*⁴ with dried Scots pine needles, especially with respect to tyrosine the influence of which on tree growth is under investigation.

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Non-parasitic Mites causing Death of Guinea-fowl Chicks

IN Britain, hay is often infested with mites, especially the species *Tyrophagus longior* (Gervais) and *Klemania plumosus* (Oud.), and Hughes¹ gives other species which occur in hay. Near Aberdeen recently, substantial losses