applied combining with any of the above drugs the analgesic activity of them was markedly reduced (*Fig. 1*).

Table 1. The antagonistic effects of the optical isomerides of adrenergic amines against Evipan in mice.

Drug		Mean waking time (minutes) the limits of P = 0.95
Evipan Na (=E)*		47 (37.21 — 57.81)
VI** + E	d-Form	20 (11.90 — 33.60)
	l-Form	22 (11.60 — 41.80)
V** + E	d-Form	32 (13.40 — 52.80)
	l-Form	32 (20.00 — 51.20)
IV** + E	d-Form	18 (11.92 — 27.18)

* Evipan: 0.5mg./10g. i.P. **IV, V and VI: 0.15mg./10g. i.P.

15. Changes of Chemical Constituents of Barley during Malting

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In the previous paper (This Bulletin, **31**, 232 (1953)), it was found that ammonium phosphate added to steep liquor produced a favorable effect on barley malting in accelerating the formation of amylases and in lowering the consumption of starch of green malts.

In the present paper, changes of chemical constituents (nitrogen matters, sugars and soluble phosphorus) of barley during malting were observed with barley (Siga Zairai) steeped in *0.1 M* ammonium phosphate (B) or in water (A). Process of malting was carried out in the same manner as was mentioned in the previous paper.

I. Changes of nitrogen matters.

Hordein- and glutelin-nitrogens decreased gradually during germination, while salt (K_2SO_4)-soluble nitrogen increased rapidly, as was already mentioned. However, hordein nitrogen of the malt (B) steeped in ammonium phosphate increased at first (during 1~3 days' germination) and then gradually decreased.

Albumin-, globulin- and amino-nitrogens always increased during germination, especially amino-nitrogen attained to the amount of thirty times of that (2 mg. N/1000 corns) of original barley. Albumin- and amino-nitrogens of the malt (B) were found to be higher than those of ordinary malt (A).

Table: Amino acids and Sugars in steeped liquor, barley and malt.

Amino acids or sugars	Barley	Steeped liquor		Green malt (1 day's)		Green malt (4 days')		Green malt (8 days')	
		A	B	A	B	A	B	A	B
Aspartic acid	+	+	+	±	+				
Glutamic acid	+	+		+	++				
Glycine	+	+		+	+			±	±
Lysine	+			+	+	+	+	+	+
Alanine	+	+	+	+	++	+	+	+	+
β-Alanine						+	+	±	±
Leucine & isoleucine	+			±		+	+	+	+
Proline	+					+	+	++	++
n. Valine & Methionine	+	+		+	+	+	+	+	
Valine				+		+	+		
Asparagine								++	++
Glutamine					+		+	++	++
Glucose	+			++	++	++	++	++	++
Galactose	+	+	+	+	+	+	+	+	+
Sucrose	+			++	++	++	++	++	++
Fructose				+	+	+	+	+	+
Xylose		+							

A, steeped in water; B, steeped in 0.1 M $(NH_4)_2HPO_4$.
Appearance of amino acids was detected by paper partition chromatography with steeped liquor (2 l. liquor per 150 g. barley) and with 70 % ethanol extracts of barley and malt.

It will be seen in the Table that kinds of amino acid in steeped liquor were remarkably different between (A) and (B); the extraction of amino acids by ammonium phosphate was limited to aspartic acid and alanine, while glycine, glutamic acid and nor-valine besides the above two acids were detected in the steeped liquor by water.

It is worth to note that formation of glutamine in (B) is already observed in early stage (1~4 days) of germination.

2. Changes of carbohydrates

Production of glucose and sucrose during malting was ascertained irrespective of the kinds of steep liquor (A) and (B), however, xylose was detected only in the steeped liquor (A), as seen in the Table.

3. Changes of water soluble phosphorus

Total soluble phosphorus in barley (about 0.065 mg. P/10 corns) reached to the maximum at 7 days' germination (0.158 mg. P/10 corns) and then decreased gra dually. The same changes as total phosphorus was observed with soluble organic phosphorus, while inorganic phosphorus was always increasing until it attaind to 0.11 mg. from 0.05 mg. Pper 10 corns.