LIII. THE SPECIFIC ACTION OF PLANT FERMENTS.

II. THE SPECIFIC CONDITIONS OF ACTION OF LEAF PEPTASES.

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THE investigations of Blagoveschenski and Sossiedov [1925] on the specific conditions of action of leaf invertases of various plant species have shown that each of these has a specific optimal p_H -value for its action. In the present paper we communicate our experiments on the action of plant peptases at various hydrogen ion concentrations.

We took samples of dried and finely ground leaves (exactly 1 g.) and mixed these with 10 cc. of 8 % peptone solution, 10 cc. of buffer (phosphate or glycine) mixture and some drops of toluene. All the flasks (two for each p_H -value) were kept in the thermostat at 25° or 30° for 72 hours. Each experimental series was followed by a control series without ferment action. The hydrolysis of peptone was measured by an amino nitrogen determination by Sørensen's method. The phosphates were removed with barium chloride and barium hydroxide. The formaldehyde titration was carried out with a comparator, for the elimination of the colour of the leaf extracts. The leaves were collected partly at Chimgan Botanical Station (*Astragalus Sieversianus* Pall., *Ungernia Severzovii* (Rgl.) B. Fedtsch., *Juglans fallax* Dode, *Prangos pabularia* Lindl., *Glycyrrhiza glabra* L.), partly in Tashkent Botanical Garden (*Syringa vulgaris* L., *Vitis vinifera* L., *Pyrus malus* L., *Pyrus communis* L., *Fraxinus* sp., *Quercus pedunculata* L., *Platanus orientalis* L.). The leaves of *Gossypium herbaceum* L. and *Gossypium hirsutum* L. were collected at the fields of the Turkestan Plant Breeding Station at Tashkent.

The data given in Table I demonstrate that the optimal concentrations of hydrogen ions for the action of peptases from leaves of various plants are very varied and specific for single plant species. It is interesting that at p_H 7.1, the neutral point, we could not find an optimum for any peptase, although they occur at both higher and lower p_H values.

We made a special comparative quantitative determination of the peptase action of 11 species at their optimal p_H values (Table II).

The activity of peptase (or its amount) in various plants is also specific.

Table I.

		p_H -values	4.5	5.4	5.8	6.3	6.7	7.1	7.7	8.0
Change of amino nitrogen content.										
1. Ungernia Severzovii	mg.	—	—	+0.7	2.1	3.5	3.8	3.8	5.3	6.3
	%	—	—	11	33	56	60	60	83	100
2. Astragalus Sieversianus	mg.	—	—	4.9	1.8	4.9	6.7	9.1	11.9	8.4
	%	—	—	41	15	41	56	76	100	71
3. Syringa vulgaris	mg.	8.4	4.2	5.6	8.4	7.0	14.0	15.4	14.0	
	%	55	27	36	55	45	91	100	91	
4. Syringa vulgaris (middle)	mg.	5.6	4.2	4.2	1.4	4.2	7.7	9.8	8.4	
	%	55	43	43	14	43	78	100	87	
	%	55	35	39	35	44	85	100	89	
5. Vitis vinifera	mg.	5.6	3.5	4.2	7.0	9.8	9.8	11.2	9.8	
	%	50	32	37	63	88	88	100	88	
6. Juglans fallax	mg.	9.8	10.2	7.0	9.8	11.2	8.4	11.2	7.8	
	%	88	91	63	88	100	75	100	88	
7. Prangos pabularia	mg.	—	—	4.9	5.9	—	9.8	8.4	9.1	7.4
	%	—	—	50	60	—	100	82	92	76
8. Glycyrrhiza glabra	mg.	8.6	—	—	6.7	10.7	7.9	9.3	7.9	4.4
	%	80	—	—	63	100	74	87	74	41
9. Pyrus communis	mg.	7.7	7.7	8.4	7.0	5.6	5.6	2.8	2.8	
	%	92	92	100	89	67	67	34	34	
10. Fraxinus sp.	mg.	5.6	5.6	7.0	4.2	2.8	4.2	1.4	1.4	
	%	80	80	100	65	40	65	20	20	
11. Gossypium herbaceum	mg.	11.2	11.2	14.0	11.9	11.6	9.1	9.6	5.6	
	%	80	80	100	85	83	65	69	40	
12. Gossypium hirsutum, No. 182	mg.	10.4	11.6	14.0	8.4	7.7	7.8	7.0	5.6	
	%	74	83	100	60	55	56	50	40	
13. Gossypium hirsutum, No. 509	mg.	9.8	11.8	13.3	10.5	8.4	6.3	7.0	4.2	
	%	74	84	100	78	70	47	53	32	
14. Quercus pedunculata	mg.	23.8	—	14.0	11.2	8.4	9.8	9.8	11.2	
	%	100	—	59	47	35	41	41	47	
15. Platanus orientalis	mg.	91	7.7	5.6	1.4	1.4	1.4	0.0	0.0	
	%	100	85	62	15	15	15	0	0	
16. Pyrus malus	mg.	7.0	—	5.6	—	2.8	1.4	0	0	
	%	100	—	80	—	40	20	0	0	

Table II.

Name	p_H (optimal)	Amino N change in mg.
Pyrus malus ...	4.5	+9.1
Pyrus communis ...	5.8	12.6
Vitis vinifera ...	7.7	14.0
Juglans fallax ...	6.7	12.8
Gossypium herbaceum ...	5.8	14.7
Gossypium hirsutum, No. 182	5.8	12.6
Gossypium hirsutum, No. 509	5.8	12.0
Syringa vulgaris ...	7.7	7.0
Fraxinus sp. ...	5.8	14.0
Platanus orientalis ...	4.5	7.0
Quercus pedunculata ...	4.5	14.0

All these results give a new confirmation to the point of view that physiologically plants can have just as definite properties as morphologically, and we have the right to suppose from these and many other similar observations and experiments the existence of a connection between the variability of the properties of living matter and that of external form.

REFERENCE.

Blagoveschenski and Sossiedov (1925). *Biochem. J.* **19**, 350.