analyzed with respect to the boron content in different parts of the fruit.

The results of analysis are as follows:

	Fruit Weight g	Total B as H_3BO_3 mg	H_3BO_3 mg	Occurrence	Percent. against Total B %
Mandalin Orange	72	1.01	0.82	in Peel	80.65
Apple	203	11.2	8.95	in Pulp	80.27
Tomato	100	1.11	0.75	in Pulp	68.47

In the case of apple and tomato the greater amount of boron is shifted into hot water extract of the pulp. And after dialyzing the extract for removing sugars, acids and mineral substances, boron could not get through the membrane combining with pectine. And the boron content of dialyzed pectine amounted to as much as 947 mg H_3BO_3 (apple pectine) and 1581 mg H_3BO_3 (tomato pectine) per Kg dry matter.

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25. Studies on Biocatalyses. (XVII)

On the Combination of Polysaccharides and Borate

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The polysaccharides such as pectine, gum and mucilage were purified removing sugars, acids and mineral matters by means of dialysis or electro-dialysis. The boron contents combined with the purified polysaccharides were estimated. The results are given in the following table:

Polysacharides	Nature of Polymer	Materials	H_3BO_3 D.M.*	Method of Separation and Purification
Pectine	Polymer of Galacturon. Acid	Tomato, pulp	1581	Hot water extract Dialysis
		Apple, pulp	947	〃 〃
		〃 〃	837	〃 〃
		Orange, peel	2359	Ammon. Oxalate extract,
Sea Weed mucilage	〃 〃 Mannuron. Acid	Sea Weed		
		Aomogusa[1]	1832	Electro-dialysis
		Hitoeguso[2]	11481	〃
		Umiuchiwa[3]	6659	〃
Gum	〃 〃 Glucuron. Acid	Peach gum	756	Dialysis
		Junsai[4]	1708	〃
Tannin	Polyphenol	Kaki-Shibu[5]	671	〃

* The numerals are represented the amount of H_3BO_3 mg per Kg of dry matter

1) Boodler coacta (Dickie) Murray et de Toni, 2) Monostroma nitidum Wittrock, 3) Padina arborescens Holmes, 4) Gummy matter from Brasenia Schr. Gmel 5) Coagulated tannin from Kaki-fruits.

As seen in the table polysaccharides occurr in natural state combining tightly with boron, probably as borate ester at the polyol radical of polysaccharides.

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26. Studies on the Metabolic Poducts of Pseudomonas Aeruginosa

On the Production of Antibiotic Substances

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With newly isolated strains of Preudomonas aeruginosa, experiments were carried out to find satisfiable conditions on the production of pyocyanine and other antibiotic substances.

It was observed that the formation of antibiotics, especially pyocyanine, was remarkably affected by various cultural conditions; kinds of nutrients or pH of the medium.

Any pigment formation and antibacterial activity were never revealed, when glucose solution (higher than 2%) was employed for glycerol which is regarded generally as a suitable source of carbon. However, the same antibacterial activity and pyocyanine formation were revealed in the medium containing 3% glucose as were observed by glycerol medium, when the solution was kept alkaline (pH 7.8–8.8).

Among various kinds of cultural solutions, the following medium was chosen for a suitable solution for the formation of pyocyanine: 3 g glycerol, 1 g peptone, 0.1 g asparagine or glutamic acid, 0.1 g NH_4NO_3, 0.025 g K_2HPO_4, 0.025 g $MgSO_4 7H_2O$ and 0.0005 g $Fe_2(SO_4)_3 10H_2O$ were dissolved in 100cc of distilled H_2O, and then adjusted pH to 7.4 (incubation temperature was 37°C).

The acid hydrolyzate of peptone was useful for source of nitrogen, but the mixture of nitrogenous matters mentioned above was found to be indispensable for the formation of pyocyanine, since no pyocyanine formation was observed with one of these nitrogen sources.

For mineral matters, K, Fe, phosphate, sulphate and especially Mg, without which pyocyanine formation never observed, were found to be essential.

The other antibiotic substances than pyocyanine were suggested to be produced by the bacteria, since no pigment formation was observed and yet noticeable antibacterial power was pointed out with some cultural solution containing different amounts of the nutrients mentioned above.