We believe that the Gordian knot may be cut by discarding the traditional definition of white, and assuming that red and green, when mixed alone, tend to cancel each other's chroma without the intervention of any blue process whatever. This leaves but little chroma for the blue to cancel when mixed with yellow. Consequently, no intrinsic blue process need be assumed to accompany yellow, and the extension of the blue curve into the yellow region need not be postulated.

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CHEMICAL COMPOSITION OF RICE AND ITS RELATION TO SOIL FERTILITY IN CHINA AND JAPAN

IN 1929 W. F. Gericke[1] offered a new explanation of the fact that oriental countries have been able to maintain a relatively high production of rice without the exhaustion of the soil similar to that caused "by continued cropping of land to cereals of occidental countries if practiced without fertilizers." On the basis of experiments in which rice was grown in nutrient solutions, he comes to the conclusion that the rices of the Asiatic countries have adapted themselves so that normal crops are produced with a low content of minerals, especially calcium, magnesium, phosphorus and sulphur. He does not make clear whether this holds only for orinetal rices or also for rice grown in other countries. If he meant that rice in general has a lower content of the mineral elements than do wheat, barley, etc., it would have been simpler to compare the respective chemical composition of these crops given in the literature instead of referring to his "minima" experiments. It is well known, for instance, that rice contains, as a rule, less nitrogen, phosphorus and potassium (the three essential elements which are generally applied in fertilizers) than do the staple cereals of this country, especially wheat. However, the average yield of rice in America, China, Japan and India is two or three times as high as that of wheat. Accordingly a crop of rice will remove from the soil at least as much plant food as a crop of wheat. The article would seem to indicate, therefore, that according to Dr. Gericke's belief the range of variation of the mineral content of oriental rices is considerably below the corresponding range of those grown on soils not exhausted by continuous cropping or grown with artificial fertilizers.

It seemed to us that a comparative analysis of Chinese and American rices could throw some light on such a hypothesis. We obtained from China samples of rice of five varieties and analyzed them for ash, nitrogen, potassium, phosphorus, calcium and magnesium. We also determined these elements in three samples of rice grown in this country and one sample grown in Porto Rico. The results, calculated on the air-dried basis, are given in Table I.

CHEMICAL COMPOSITION OF CHINESE AND AMERICAN RICES

		Percentage on Air-dried Basis						
No.	Origin	Ash	N	P_2O_5	K_2O	CaO	MgO	S
1	China	1.22	1.23	0.60	0.259	0.014	0.187	0.087
2	"	1.24	1.26	0.64	0.273	0.020	0.206	0.084
3	"	1.32	1.23	0.65	0.264	0.020	0.208	0.105
4	"	1.39	1.26	0.68	0.293	0.020	0.224	0.086
5	"	1.30	1.23	0.66	0.312	0.019	0.214	0.086
6	United States	1.58	1.44	0.76	0.314	0.025	0.244	0.091
7	" "	1.20	1.46	0.58	0.238	0.022	0.208	0.098
8	" "	1.58	1.46	0.76	0.328	0.020	0.235	0.099
9	Porto Rico	1.24	1.01	0.56	0.306	0.025	0.193	0.065

It is realized that these results are too meager to form a basis for definite conclusions, but these samples, picked at random, do not indicate any striking differences in composition between the Chinese rices, grown on a soil presumably cropped for thousands of years, and the rices grown under the American method of cropping.

Moreover, Dr. Gericke's explanation does not take into account nitrogen and potassium, which, with phosphorus, are most frequently the limiting factors in crop production. Calcium, magnesium, sulphur and iron are found in crops in relatively small quantities and are seldom applied as fertilizers. Furthermore, the late Professor F. H. King, in his book, "Farmers of Forty Centuries" (quoted by Dr. Gericke), claims that "these people (Chinese and Japanese) are now and probably long have been applying quite as much of these three plant foods (nitrogen, potassium and phosphorus) as are removed by the crop" (p. 190). It is true, then, that rice in China and Japan is grown under continuous cropping but not without restitution of plant food.

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[1] SCIENCE, 70; 1818, pp. 430–432.

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