it is milled to a less extent (about 5 per cent.) than raw rice (15–20 per cent.).

It may be seen from Table I, that between 5 and 15 per cent. of polishing, a large part of the nitrogen and phosphorus of the hulled rice are lost. As already explained, this portion is generally preserved in parboiled rice so that it becomes very much richer in these two valuable constituents than polished, raw rice of commerce.

TABLE I.

Nitrogen and Phosphorus contents of Raw and Parboiled Rice Polished to Different Degrees.

Raw Rice			Parboiled Rice		
Degree of polishing (*per cent.*)	Nitrogen as mg. per 100g.	Phosphorus as mg. per. 100 g.	Degree of polishing (*per cent.*)	Nitrogen as mg. per 100g.	Phosphorus as mg. per 100 g.
Variety Adt. 11.					
Unmilled	1114	160	Unmilled	1138	160
1·0	1103	154	2·0	1111	148
2·0	1092	147	3·8	1092	136
3·7	1061	134	5·3	1077	127
5·5	1038	122	6·6	1064	118
7·3	1015	109	8·1	1046	107
8·8	996	98	9·2	1030	98
10·8	973	85	11·4	1000	79
12·8	949	74	13·4	971	60
15·8	914	59	15·4	939	44
19·3	871	33	18·4	894	20
24·3	830	25	23·4	841	—
Variety Co. 9.					
Unmilled	1239	366	Unmilled	1269	360
2·0	1227	334	2·5	1252	325
3·8	1214	300	4·0	1242	298
6·3	1194	251	7·0	1220	246
7·8	1180	221	9·2	1201	201
9·3	1164	193	10·7	1188	172
11·7	1139	151	12·7	1163	124
13·4	1121	124	14·5	1105	75
14·6	1107	107	15·7	1086	55
16·3	1089	85	16·7	1070	31
18·6	1060	73	19·2	1040	20
23·6	1038	—	23·2	1009	—

Parboiled rice is generally poorer in fat than raw rice polished to the same degree. This would account for the slightly better keeping quality of the former. During parboiling, the starch gets partly gelatinised so that, on cooking, parboiled rice tends to stiffen more readily than raw rice. This would account for the better keeping quality of cooked parboiled rice, especially when stored under water.

Parboiled rice of commerce is generally prepared out of the so-called coarse or coloured varieties of rice as also those which tend to get readily broken on milling. (The milling quality of rice is greatly improved by parboiling). The recent observations of the authors would show that some of the coloured varieties (and coarser varieties in general) have thicker bran layers and contain very much more of nitrogen and phosphorus than the superior white varieties. This may also have some bearing on the high nutritive value of parboiled rice.

A. SREENIVASAN.
H. P. DAS GUPTA.

Department of Biochemistry,
Indian Institute of Science,
Bangalore,
July 7, 1936.

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Respiration of Ripening Tomatoes.

IT has been accepted by plant physiologists that in the development of fruits the intensity of respiration as measured by CO_2 evolution supplies a general indication of the magnitude of metabolism. In fruits, it has been found that the ontogenetic metabolic drift from adolescence through maturity to death is represented in respiration by a curve which shows two high values separated in time: one is initial and represents a high rate of respiration in young fruits, the other occurring at the onset of senescence, known as the climacteric, is generally associated with the change in colour during ripening. The causes underlying the climacteric rise in respiration of ripening fruits are not fully understood. Blackman and Parija[1] explained the rise in respiratory activity in apples on the assumption that in the senescent stage a lowering of "hydrolysis-resistance" occurs leading to a greater production of substrate for respiration. Kidd and West[2] have attributed the initial increase in CO_2 output during senescence to the action of some "protoplasmic factor". Gustafson[3] suggests that the climacteric rise is probably due to a lowering of pH of the cell-sap during ripening. The causes of the post-climacteric decline in ripening fruits likewise have been the subject of some controversy. Blackman and Parija believe this decrease in respiration to be due to starvation. Gustafson, on the other hand, concluded that in view of the fact that the percentage of total sugars in a ripe tomato is nearly twice that of a two-week-old fruit the final decrease in respiration cannot be due to starvation, but that "the decrease in respiration in the mature fruit might rather be attributed to complete cessation of all activity".

In the course of some biochemical studies on ripening of tomatoes the data obtained indicated that increasing amounts of CO_2 accumulate in the fruit tissue during ripening. Evidently in massive structures like ripe tomatoes the superficial tissues offer a great resistance to the movements of gases and the total CO_2 production during metabolism is not the same as that evolved at the surface. Two questions arise in this connection : (i) Is the climacteric rise in ripening tomatoes due solely to the establishment of a steep gradient between the concentration of CO_2 inside the fruit and that in the outside atmosphere, or (ii) Is it due to a lessened resistance of the superficial tissues to the diffusion of gases ? In an attempt to get an answer to these questions the CO_2 dissolved in the fruit sap, respiratory quotient and the permeability of the superficial tissues to gas were determined at regular intervals during the stages of ripening and senescence.

Dissolved CO_2 was determined in accordance with the method described by Willaman and Brown[4] and for determining the permeability of superficial tissues to gas the apparatus used by Smith[5] for extracting gas from potato tubers was employed. Eight tomatoes, approximately alike in size and shape, were selected for each determination, the gas being collected in a gas burette after two minutes' extraction in a Torricellian vacuum. Relevant data are tabulated below:

Colour of the fruit	CO_2 liberated ml. kilo/hr.	Dissolved CO_2 ml. per kilo	Gas extracted from 8 tomatoes, ml.	R. Q.
Green ..	17·7	19·7	3·31	1·11
,, ..	19·3	20·3	3·36	1·08
Yellow green ..	20·3	20·1	3·79	1·07
,, ,, ..	26·7	21·7	3·85	1·01
Green orange ..	30·3	26·2	3·98	1·00
,, ,, ..	29·2	27·1	3·73	0·99
Orange red ..	27·3	30·6	3·01	1·01
,, ,, ..	20·7	33·3	2·87	1·23
Red ..	13·9	37·9	2·72	1·27
,, ..	11·7	37·1	2·46	1·29

An examination of the data shows that considerable amounts of CO_2 accumulate in the fruit tissue during ripening and that the R. Q. starts with a value somewhat higher than unity, comes down to unity during the climacteric phase and again rises gradually to 1·29. The value for the amount of gas extracted from the fruits gradually rises with the increase in rate of respiration up to the time when the peak value characteristic of the climacteric stage is obtained, after which a rapid decline is discernible. Evidently during the climacteric stage the resistance offered by the superficial tissues to the movement of gases—CO_2 outwards and atmospheric gases inwards—is lessened, thus augmenting not only the rate of CO_2 production but also that of oxygen intake. The suggestion is made that the climacteric rise in tomatoes, is in all probability, in part due to the establishment of a steep gradient of CO_2 concentration as also to an increase in the permeability of the superficial tissues to the diffusion of gases.

Another point which emerges from this investigation is that whereas the superficial CO_2 evolution declines after the climacteric, the dissolved CO_2 in the fruit tissue progressively increases. This increase in the concentration of CO_2 indicates an active rate of metabolism even in the post-climacteric phase. The decline in the respiration rate following the climacteric rise is probably explainable on the basis of a lowered permeability of the superficial tissues to the