Some Findings in Chinese Cabbage during Cooking

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Summary — Chinese cabbage raw, steamed for 1, 5, 10 and 30 min. were studied microscopically. It was found that as the time for cooking was increased the palisade and spongy parenchyma cells tended to loosen and coagulate as compared to the raw state. Translucency of the epidermal cells and changes in the chloroplasts were also observed.

Introduction

It is well known that heat decomposes chlorophyll (*1*). The extent of decomposition depends on the time and temperature of heating, the rate of color change increasing in time and temperature of heating. This has been confirmed in the previous paper on the study of string beans (*2*). It was also noted in string beans that as the time for cooking increased substances within each cell tended to loosen and coagulate and when cooking was up to 30 min. breaks in the epidermal and parenchyma cells and extreme shrinkage within the endodermis was observed. Since the structure of string beans differ from that of Chinese cabbage histologically (*3*), the present report will deal with observations on the structural change in Chinese cabbage when steamed.

Chinese Cabbage

Materials and Methods

Chinese cabbage raw, steamed for 1, 5, 10, 30 min. were fixed and embedded in paraffin as previously reported (*4*). Paraffin ribbons were cut 12 microns thick with a Yamato sliding microtome, stained with Heidenhain's iron-alum haematoxylin according to Chamberlain (*5*) and mounted with balsam. For photomicrographs equal exposure times were used. Development of the photographs was by conventional means, and absolutely uniform procedures were used throughout.

Results and Discussion

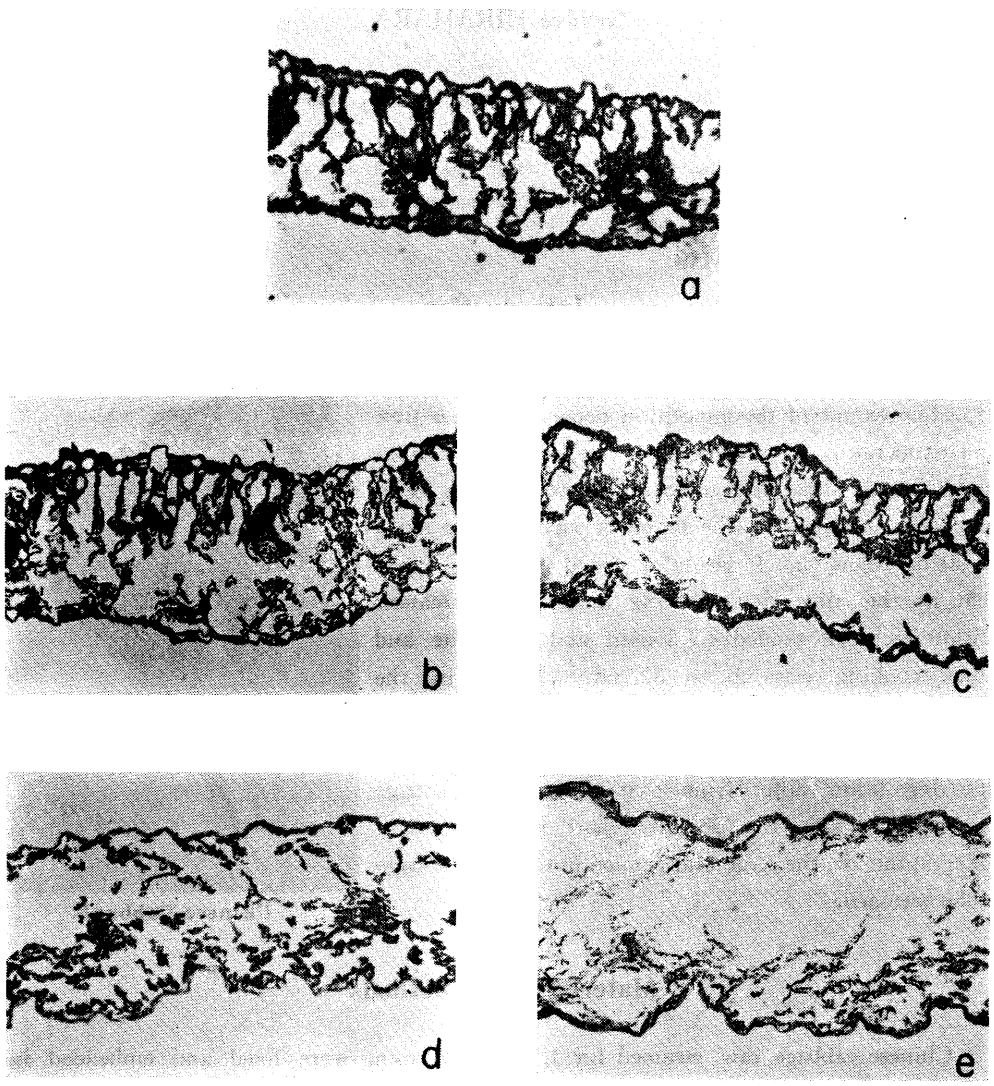

Fig. 1. Transverse sections of Chinese cabbage. a. raw, b-e. steamed for 1, 5, 10, 30 min. respectively. Embedded in paraffin; cut 12 microns thick; stained with Heidenhain's haematoxylin. Magnification × 150.

Fig. 1a–e are photomicrographs of Chinese cabbage raw, steamed for 1, 5, 10, 30 min., respectively. In the freshly harvested raw state of Chinese cabbage the intacted chloroplasts appear to be distributed in rows around the periphery of the palisade cells. The spongy parenchyma cells are also neatly arranged. After 1 min. of steaming shrinkage of palisade cells, separation of the spongy parenchyma cells from the epidermal cells and loosening of the chloroplasts can be seen. This may be due to the heat softening the cell walls and in turn causing the chloroplasts to loosen. At 5 min. further shrinkage of the palisade cells and coagulation of the spongy parenchyma cells are observed. Besides these findings being still more significant at 10 min., a translucency of the epidermal cells are noted.

After 30 min. of steaming changes are of the extreme. Although the structure of Chinese cabbage differ from that of string beans it can be said that as cooking time is increased a similar change within the cell membrane can be seen. Further detailed studies are now under investigation.

References

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