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Investigation of the Heat Stability of Serine Protease Inhibitors from Canary Beans

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ABSTRACT
Serine proteases are the major class of protein digesting enzymes. The protein found in canary beans inhibits digestive enzymes such as chymotrypsin and trypsin, which are found in the small intestine. Protein from canary beans was extracted and studied for its stability to temperature at 100°C. The results suggest that the protein is exceptionally stable. A possible consequence of temperature stability is that when canary beans are consumed by human, the inhibitors in there may affect the digestive process in the small intestine.

BACKGROUND
Protease inhibitors are an important class of proteins. They function by inhibiting the enzymatic activity of serine proteases such as chymotrypsin and trypsin. Protease inhibitors are ubiquitous. Beans are particularly rich on protease inhibitors. In this research, I have investigated the the possible role of bean protease inhibitors in the inhibition of intestinal serine proteases.

EXPERIMENTAL
The enzymatic activity of chymotrypsin and trypsin was measured by using synthetic substrates such as suc-ala-ala-pro-leu-pNA and benzoyl-Arg-pNA. The action of enzymes on these substrates produces a yellow color due to release of pNA group. The appearance of yellow color was followed spectrophotometrically at 400nm. The rate of absorbance change is directly proportional to the enzyme concentration. Addition of an inhibitor (such as canary bean extract) produces a decrease in the rate of the reaction.

RESULTS
(i) Inhibition of chymotrypsin by canary bean extract
(ii) Inhibition of trypsin by canary beans extract

CONCLUSIONS
(i) Canary beans contain serine protease inhibitors that inhibit both trypsin and chymotrypsin.
(ii)The canary bean inhibitor is quite stable to a temperature of 100°C and retain one-third of its activity after one hour of heating 100°C.
(iii)The inhibitor may be active in cooked beans and may inhibit digestive enzymes in the small intestine which can induce slower digestion in the small intestine.