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Opinion Article Open Access

Concentrating Now-Wasted Protein Resources

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Opinion Article

Congratulations to the Journal of Biodiversity, Bioprospecting and Development on its valuable recent publication of "Bioprocessing of Agricultural Wastes…" as a resource for Xylanase production! As long ago as 1969, the American Chemical Society meeting in New York City identified a world-wide "protein-shortage" situation, now addressed by this useful recovery and concentration scheme. Then US Secretary of Agriculture Orville Freeman was given a private corporation mandate "to develop new approaches to food production, processing and distribution, as well as analyze present and future uses of human and natural resources."

Your just-published article shows how we can explore these new methods of developing unconventional protein sources available from "blooms" in the sea, unused fragments of current crops, and extracts from foliage and grasses in general. Almost all of these contain proteins extractable with readily available solvents, but the serious problem remains of their purification and concentration into a dried, food-compatible form.

The following sketch shows a laboratory device, a larger version of which I have also used in the field, for testing a concentration scheme based upon the remarkable surface activity of proteins and their irreversible mode of collapse from spread surface films into insoluble fibers. If a small energy source were used to drive such a concentration device, the yield would be a valuable protein product.

Although nuclear sources are not in fashion, if a small nuclear device were used to drive such a concentrator, specially placed gaps in the radiation shielding could be provided to simultaneously radiation-sterilize and radiation-tenderize (via chain scission mechanisms common when radiation interactions with polymers) the accumulating concentrated product. Constant input of protein-rich extract to a device of this sort, and steady outflow of the de-proteinized liquor back to the extraction step, would provide an efficient on-stream continuous concentration process (Figure 1).

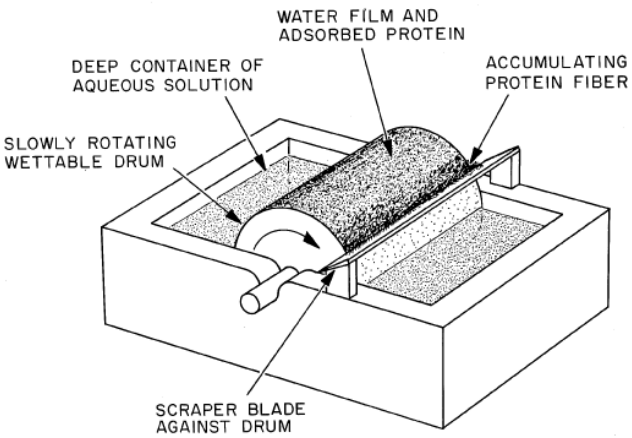

Figure 1: Bull roller experiment.

In a 24-hour period, I have been successful in harvesting ALL of the dissolved protein from a salt-water extract of wasted fish parts by this method. Placement of large sausage-like cylinders (resembling, if not identical to, large pods used for off-shore oil storage) in fertile areas of the sea would allow in situ collection and concentration of protein from plankton and algae blooms, which incorporate the millions of tons of now-wasted proteins that occasionally cover many islands with heaps of wind-driven sea foams!