C O N C L U S I O N S

CONCLUSIONS

1. Bacterial oxidation, photosynthetic reduction and algal synthesis take place such that excess oxygen is made available for complete aerobic bacterial oxidation and stabilization of organic matter and production of an abundance of algae.

2. These biochemical reactions are rendered possible on account of the penetration of light energy into the shallow depth of the culture flasks throughout day and night excepting for a few hours of darkness resulting from periodical currant stoppage.

3. Mixing for a few hours every day helps in distributing oxygen throughout the liquid medium and in maintaining the bacterial sludge in an aerobic condition so that bio-stimulatory nutrients are released into the medium for algal synthesis. Also, it is another way of increasing the photosynthetic efficiency of the algal cells.

4. The entire bio-chemical processes resemble those taking place in the euphotic zone of a shallow pond in the tropics.

5. The rate of algal synthesis is maximum during the first two days, when BOD_5 used up is also maximum and photosynthetic oxygen production is also maximum. On subsequent days (2 to 6) the algal production is considerably lower; and this period would seem to correspond with the period of endogenous respiration, when nutrients are released back into the system.

6. Coliform and total colonies count though amounting to 99% reduction still the number of organisms present in the medium on the sixth day is comparatively higher; and this has been attributed to cellular synthesis of heterotrophic, non-photosyn-thetic bacteria taking place along with bacterial oxidation.

7. The dominancy of bacteria differ in assimilatory and endoge-
-nous phases indicating endogenous metabolism taking place in the system.

8. During the phase of bacterial oxidation of organic matter, complete oxidation of organic matter, cellular synthesis and bacterial sludge formation do take place along with endogenous respiration of the bacterial sludge thus formed, in the presence of excessive amount of photosynthetic nascent oxygen and newly formed algal cells.

All these processes are taking place almost simultaneously with the result that an abundance of algal cells alone is visible, of course intermixed with the skeletons of bacterial sludge and newly formed algal cells. These reactions are continuous so that it is not possible to say which of the biochemical reactions is taking place first and which next.

9. A theory of "total oxidation" has been developed involving the use of microbial metabolic reactions to account for the absence of excessive bacterial sludge as in the case of the classical activated sludge process, where endogenous respiration is not allowed excepting in the case of the extended amount of similarity between the extended aeration activated sludge process and the high-rate aerobic oxidation pond system especially in regard to the comparatively smaller accumulation of sludge and the presence of a large amount of oxygen.

10. a. For the first time a method has been deviced for the quanti-
-tative evaluation of algal-bacterial symbiosis using the two most important parameters COD and algal bio-mass.

b. These studies are helpful in predicting operational performance

10. b of new and existing ponds from the estimated COD value of the waste water. It is possible to predict the quantity of algae that can be produced from it and also the amount of O_2 that can be available for biosynthesis and oxidation of organic matters in the waste water.

c. A high degree of direct correlation between algal bio-mass and its corresponding COD value has been established.

d. From the estimated values of algal bio-mass and light intensity at any locality it is possible to estimate the energy conversion efficiency of an alga.

e. Public health engineers seem to be under the impression that the organic matter content of the sewage will provide enough carbon for sufficient algal bio-mass production for releasing the required amount of oxygen for oxidising the organic matter + to keep the system aerobic.

It is not so, for a certain quantity of CO_2 from the atmos--phere is also required for the purpose. This method of treatment is a case of the integrated secondary tertiary treatment system very useful for application for preventing eutroplication of receiving waters and for manufacturing cheap algal protein so badly needed in the tropics for meetin protein defficiency.

11. In India, ponds resembling high-rate aerobic pond system, have been in existence for the past several centuries with perma--nent blooms of blue-green algae, the like of which exist no where else in the world. They are temple tanks attached to each of the hundreds of ancient temples in India. They are highly organically contaminated (of course not with sewage) and it will be of great scientific interest and practical value if the biochemistry of a few of them are thoroughly studied.