

SYMBIOSIS

On Ralph Lewin

The word "symbiosis" means, literally, living together, and the word "symposium" implies sitting together at the same table. It was appropriate to hold a symposium on marine symbioses at Eilat. This is a town on the south coast of the Holy Land where, one hopes, a spirit of ecumenism may help peoples of different faiths to live together — perhaps even for mutual advantage. The word "ecumenism" comes from the same Greek root word, *oikia*, that gives us "ecology" and "economics": they all imply, to some extent, interactions under a common roof.

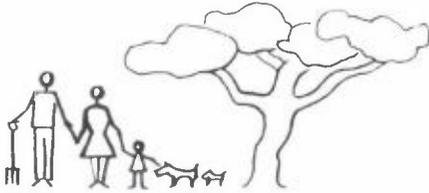
Ralph Lewin, though not himself a symbiologist, was for some reason invited to take part in this symposium, and he contributed an illustrated talk in which he reviewed, in simplistic fashion, the much-discussed meaning of the term "symbiosis". Most of his arguments were presented, a few years ago, in an article published in *BioScience* (32: 254–259, 1982), and they will not be repeated here. In brief, he tried to argue for an objective rather than a didactic approach to the subject. First, he emphasized that there are all sorts of ecological interactions among organisms: cannibalism, carnivory, herbivory, allelopathy, parasitism, etc. Next, he argued that the various effects of different organisms on one another should be measured quantitatively, either by population dynamics or by what one might call trans-nutrition. And only then could one determine which interactions might be mutualistic, with some "benefit" in both directions — not from any ethical feelings of gratitude for services rendered, but merely out of immediate or eventual self-interest on both sides. In the economic philosophy of the marketplace, symbiosis could be likened to trade, and predation and parasitism to robbery, free-loading, etc. In other words, it is only for those cases in which reciprocity can be demonstrated that we can justify use of the term "symbiosis".

Lewin illustrated his talk with a few crudely executed diagrams, some of which are reproduced on these two pages.

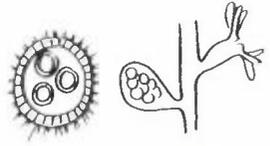
SYMBIOSIS

ΣΥΜΒΙΩΣΙΣ

= LIVING TOGETHER



SAME SPECIES
" CLONE



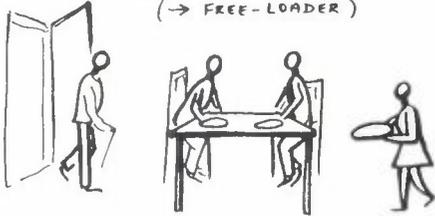
SAME SPECIES
DIFF. GENOTYPE



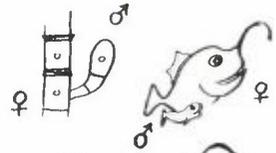
PARASITE

ΠΑΡΑΣΙΤΟΣ

= FELLOW-DINER
(→ FREE-LOADER)



SAME SPECIES
DIFF. SEX



INTRACELLULAR
SYMBIONTS



TERMS AS USED BY:

DE BARY (1879)



PRESCOTT



PARASITISM

PARASITISM

SYMBIOSIS

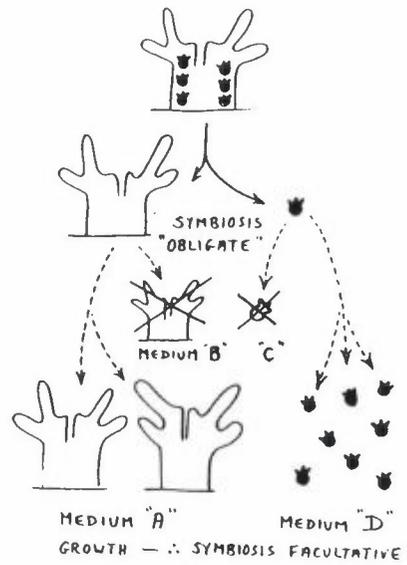
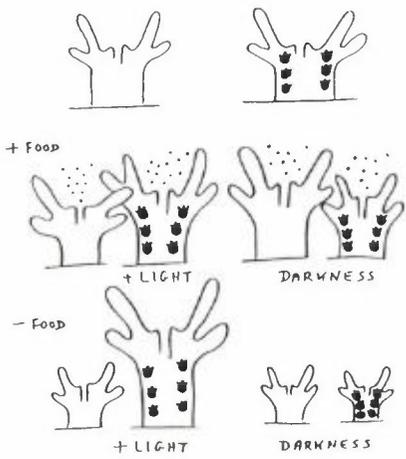
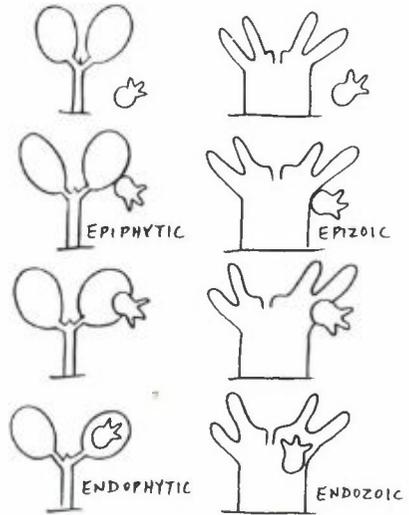
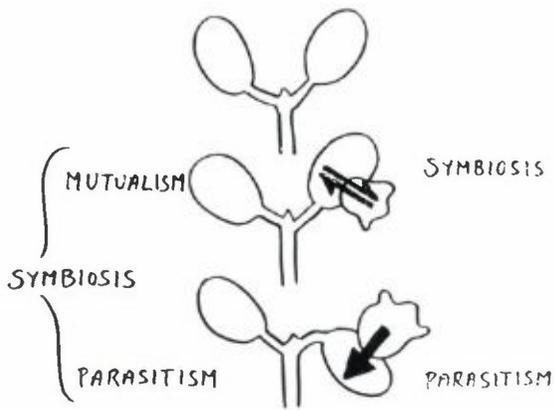


MUTUALISM

SYMBIOSIS

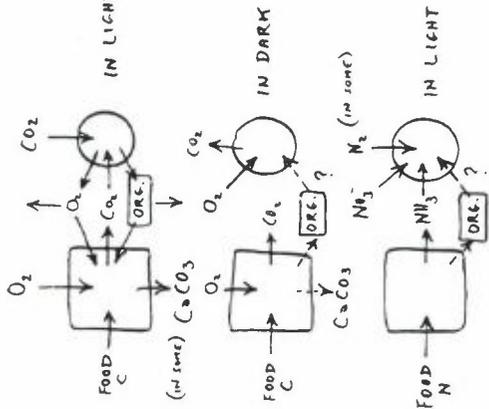
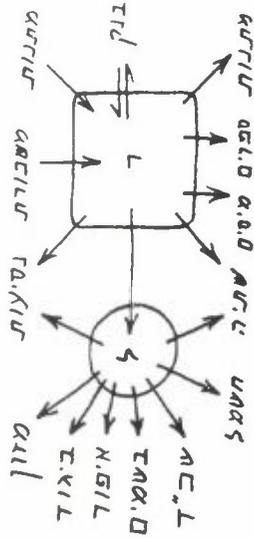
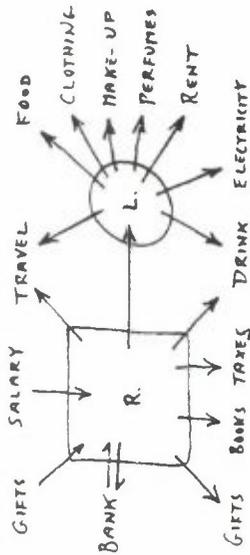
TERMS AS USED BY:

- BOLD + WYNNE
- CARR + WHITTON
- CHAPMAN + C.
- DAWSON
- DODGE
- FOGG + AL.
- FOTT
- FRITSCH
- LEWIN
- SMITH
- TIFFANY
- TILDEN
- TRAINOR
- WEST



SYMBIOSIS ($\text{GYV} + \text{BIOLOGIS} = \text{with + living}$)

סימביוזיס = $\text{סימ} + \text{ביוולוגיס}$
 עם + חיים



QUANTITATIVE DATA NEEDED

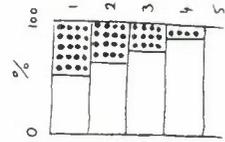
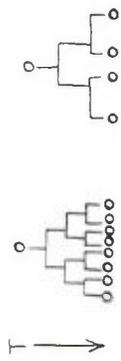
A. BIOCHEMICAL + PHYSIOLOGICAL



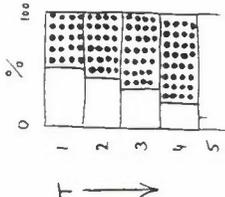
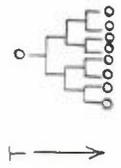
B. LIGHT + SPACE



RYBOSOMES 10,000 → 5,000
 MITOCHONDRIA 100 → 50



PARASITISM



SYMBIOSIS