

that during the first hour or two of growth the bacteria grow rapidly in size and do not greatly increase in number. Then, at a clearly defined time multiplication sets in and the organism population increases. Cell metabolism is therefore highest at the beginning of cell growth and not, as is generally said, after a period of lag.

The study of the action of bacteria shows the organisms growing steadily up to the time when the phage was introduced into the solution. Then quick-

ly the solution begins to clear up and allow more light to pass through. This indicates that the phage is "eating up" or destroying the bacteria.

First work on the development of the densitometer and its optical technique of studying bacterial growth was undertaken while he was at Stanford University, Dr. Mestres stated. The work is now being continued at Yale, where Prof. C. E. A. Winslow is chairman of the department.

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PLANT PATHOLOGY

Blame for Eel-Grass Disease Laid on One-Celled Animal

HUNTERS on the Atlantic coast who have been unable to find any water-fowl to shoot at can address their woes to *Labyrinthula*, a microscopic, single-celled, parasitic animal, researchers at the New Jersey Agricultural Experiment Station at Rutgers University have revealed.

Labyrinthula has practically ruined the pastime of many sportsmen by causing an epidemic wasting disease that has killed eel grass along the entire Atlantic coast and has thus destroyed or greatly reduced the principal food of geese, brant, certain species of ducks, and various economically valuable fish and mollusks, particularly scallops.

Charles E. Renn, Station microbiologist, who has been cooperating with the Woods Hole Oceanographic Institution, discovered that *Labyrinthula* causes the wasting disease while working under the supervision of Dr. S. A. Waksman, head of the Station's department of soil microbiology and a member of the Oceanographic Institution. Mr. Renn encountered a hitherto unreported spindle-shaped micro-organism in the diseased leaf tissue of the eel-grass. The organism occurred with such regularity and was so oriented in the tissues that it was immediately placed under suspicion as a parasite, and a study of the habits of the living form undertaken. Its true parasitic nature was established.

Mr. Renn's research demonstrated that *Labyrinthula* could penetrate eel-grass leaves and produce the wasting disease in from four to forty-eight hours. Affected eel-grass is weakened and made susceptible to the attacks of

bacteria, fungi, and other parasitic organisms.

The recent outbreak of the wasting disease was reported as early as 1929, but not until 1932, when eel-grass was almost entirely destroyed along the Atlantic coast, was the seriousness of the ailment impressed upon sportsmen. There was some recovery early in 1933, but before the summer's end destruction of the eel-grass had again increased to an alarming extent. The same situation prevailed in 1934.

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ICHTHYOLOGY

Fresh-Water Fish Learn To Live in Sea Water

GUPPIES, mild little family-loving fish now much in vogue with amateur aquarists, have been turned into hardy, sea-faring "old salts" by Miss Gloria Hollister, research associate of the New York Zoological Society. Miss Hollister tells how she has been able to get guppies, which are normally fresh-water fish, to adapt themselves to life in full-strength sea water. (*Bulletin, New York Zoological Society*, Nov.-Dec.) Young fish have been born in the salt water, and both parents and offspring are still living.

Miss Hollister began by putting guppies into mixtures of fresh and salt water of various strengths. All the guppies continued to live when the mixture contained no more than 50 per cent. of sea water. In a 60 per cent. mixture 71 per cent. of the little fish survived. Even when their first experi-



CAPTAIN OF A WHALE

It looks like a sculpture of a grotesque little old man's head, but it is really the otic capsule, or bony ear-box, of a sperm whale, which houses not only the huge mammal's organs of hearing but the apparatus which controls his sense of balance, and thus his ability to get about in the sea. Its natural dimensions are about double those shown in the illustration. This specimen belongs to Dr. H. C. Bryant of the U. S. National Park Service.

ence with salt water was a 70 per cent. mixture of sea water with fresh, about a fifth of the guppies lived. But an addition of 75 per cent. or more of salt water to the fresh was too much for the guppies.

Miss Hollister then "acclimated" guppies by starting at the 50 per cent. level and increasing to larger and larger concentrations of salt until finally she had them living in perfect contentment in 100 per cent. sea water.

The new environment has not been wholly without effect on the guppies' behavior. They developed a behavior peculiarity which she calls "the spirals," a tendency to swim in a spiral track, sometimes going through the performance on their backs. They go into "the spirals" whenever they are startled, as by a sudden flash of light.

Miss Hollister has put several other fresh-water fish through a course of salt-water adaptation. She has also reversed the process, inducing certain salt-water fish to become used to fresh water. In one tank she has two fish species, one normally living only in fresh water, the other only in salt, swimming about together, both apparently quite comfortable and happy.

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