Newcomb Studying Crab 'Clocks'

A study of built-in "clocks" in tiny fiddler crabs at Newcomb College may be useful in setting the course of a man's future work day.

This study, now under way in the laboratory of Dr. Milton Fingerman, professor of zoology at Newcomb, may require sending the fiddlers into orbit around the sun in a satellite.

Such an orbit would be necessary to help prove or disprove the theory that whatever force influences cosmic rays also affects the 24-hour timing cycle of the fiddler crabs -- and the "sleep-wakefulness" period of man!

The proposed experiment in outer space with fiddlers would provide information useful in regulating sleeping habits of space-bound astronauts of the future, according to a consultant of the National Aeronautics and Space Administration.

An advisory committee of NASA biologists is expected to reach a decision after a further discussion on the project later this year.

DR. FINGERMAN, ONE OF THE nation's foremost specialists in the study of Crustacea, notes that at least a part of the fiddler's timing mechanism is built into its body, which changes between light and dark in color in perfect coordination with the time of the day.

During the day, when cosmic radiation is greatest, the crab's skin within the shell increases in shades of darkness, reaching a peak during the day at a time when the tide is low. This may be how Mother Nature lets the crab know it is feeding time, Dr. Fingerman points out.

By contrast, during the night when cosmic rays are less dominant, the skin grows paler in color. Tides do not affect the color change at night.

"Scientists have determined that cosmic radiation affects the degree of pigmentation in the skin of the crabs," Dr. Fingerman says.

"But we don't know whether the color change cycle of the fiddler crab, which presumably involves the same mechanisms for timing as the 'sleep-wakefulness' cycle in man, regulates the cosmic rays, or whether the cycle is completely built-in," he explains.

"WE DO KNOW, HOWEVER, THAT COSMIC radiation, the coloration or timing changes in the fiddler crab, and man's 'sleep-wakefulness' period all occur on 24-hour cycles," Dr. Fingerman emphasizes.

He believes that by sending the fiddlers into orbit outside the influence of the cosmic ray belt, scientists could measure the coloration changes in their bodies to determine whether cosmic ray forces do influence the timing cycle.

"Then, we may have more substantial backing for the hypothesis that the mechanism that switches on the 'sleep-wakefulness' cycle in man is the same instrument which accelerates the color change cycle in the fiddler."

Research being conducted by Dr. Fingerman is not limited to the fiddler, but involves the common New Orleans crayfish as well.

In both forms of Crustacea, color changes occur in their skin when the neurosecretory gland in the eye-stalk is notified to release a hormone responsible for the correct pigmentation.

The color change in the crayfish does not occur according to the 24-hour timing cycle. However, it, too, is regulated by the neurosecretory gland in the eye-stalk, which orders a color change according to the amount of light striking the eye. Oddly enough, this coincides with the particular background of the crayfish.

Dr. Fingerman, in order to learn more about the timing mechanism in the Crustacea, is attempting to isolate and break down the chemistry of the specific hormones charged with setting off the color changes.

THROUGH THIS WORK, DR. FINGERMAN hopes eventually to help other scientists learn more about the neurosecretory mechanisms and biological clocks in man which are virtually the same as in the Crustacea. The neurosecretory gland, he notes, is a combination nerve cell and hormone producer.

Dr. Fingerman's reputation in the field of Crustacea is world-wide. Four post-doctoral students from Japan and one from Poland have come to Tulane to study and conduct research with Dr. Fingerman, a Tulane faculty member since 1956.

One such student, Yoshihiro Yamamoto of Japan, is now completing a year of research on a tanning hormone that is activated in the crayfish after shedding.

Dr. Fingerman has written 127 scientific articles, primarily on Crustacea, which have been published in professional magazines and periodicals. His book, "The Control of Chromatophores," published in 1963, describes the work of the color-changing pigment cell in all species of the animal kingdom.