Comments and Communications

Comment on Flying Saucers

I WOULD like to call to the attention of your readers that the entoptical theory of E. F. Mauer (SCIENCE, 116, 693 [1952]) that the flying saucers may be spots before the eyes, is untenable.

If such a theory would be correct, one would expect a more or less even geographical distribution of the sightings, expressed—say—in terms of sightings per million population per year.

From the declassified version of an Air Force Report, it is possible to find the geographical distribution of the sightings, and this indicates that the distribution is not uniform, but shows definite maxima in certain regions of the country. This is definitely not in agreement with any entoptical interpretation.

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A Single Tube Method for Anaerobic Incubation of Bacterial Cultures[1]

PREVIOUSLY described methods for obtaining anaerobiosis in culture tubes either require that the tube be inverted or that accessory equipment be used (*1*). By the procedure reported here, it is possible to obtain anaerobic conditions in individual tubes without the use of special media or apparatus. This method has been found especially applicable when it is desired to follow the progress of anaerobic growth in broth by turbidimetric procedures.

A 5/8 by 6 in. culture tube containing up to 10 ml of medium is stoppered with a cotton plug rolled tightly around a small vial, as shown in Fig. 1A. These tubes can be inoculated in the usual manner, and will permit normal aerobic growth. When anaerobic conditions are desired, the cotton plug is pushed down into the culture tube until the top of the vial is below the lip of the tube. Two milliliters of 40% KOH and 2 ml of 20% pyrogallol are pipetted into the vial. Immediately after addition of the second reagent, the mouth of the tube is flamed lightly, and a rubber stopper, previously coated with paraffin, is inserted. The stopper is held firmly in place for a few seconds until the tube cools and the paraffin hardens to form a seal (Fig. 1B).

Experiments have shown that the anaerobiosis is complete and fairly rapid. When incubated in this manner, facultative organisms do not grow on media which support aerobic but not anaerobic growth. *Aerobacter aerogenes,* for example, will grow aerobically but not anaerobically on synthetic medium containing lactate as sole carbon source. Methylene blue indicator solution (*1*) in such tubes is visibly reduced after a few minutes and totally decolorized in two hours.

[1] The writer is a Public Health Service Research Fellow of the National Institutes of Health.

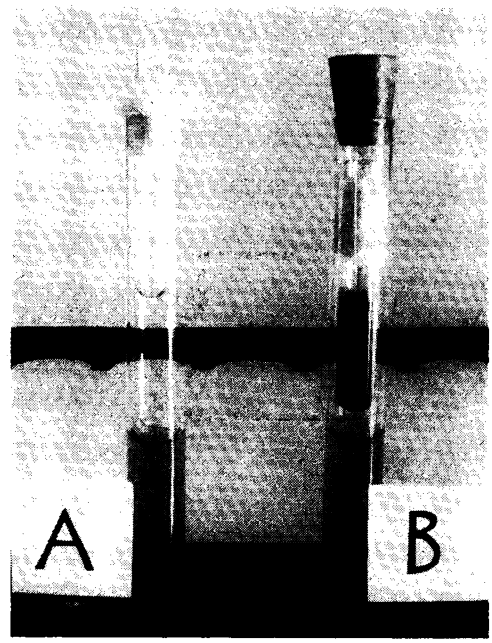

FIG. 1. Single tube for aerobic or anaerobic growth. A, aerobic conditions; B, anaerobic conditions.

Rapid attainment of anaerobic conditions may be improved by folding accordion-wise a strip of filter paper slightly longer than the inner vial and placing it in the vial to provide greater surface for oxygen adsorption.

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Reference

1. SOCIETY OF AMERICAN BACTERIOLOGISTS. *Manual of Methods for Pure Culture Study of Bacteria* (Leaflet III). Geneva, N. Y.: Biotech. Publ. (1952).

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Pain—Controlled and Uncontrolled

THE sources of the disagreement expressed in the two communications on the subject of pain by Henry K. Beecher and by Hardy, Wolff, and Goodall (SCIENCE, 117, 164 [1953]), can be seen to arise from certain errors on both sides. Dr. Hardy and his group base their arguments upon studies in which they have been attempting to measure accurately the pain that arises under controlled experimental conditions, when normal healthy tissues are exposed to a noxious stimulus. They have failed to recognize that the pain they are measuring is fundamentally different from that pain which originates within tissues whose metabolism has become deranged through damage or disease, and thus constitutes a sign of existing injury.

On the other hand, Dr. Beecher has approached the problem at the clinical level but has confused the issues by insisting upon an artificial distinction be-

tween what he terms, "experimental" and "pathological" pain. Many observers have recognized that two different types of pain exist, and have sought to define them in various ways. Thus we find reference in the literature to deep and superficial pain, cutaneous and visceral pain, epicritic and protopathic pain, etc. Recognizing the dichotomy of pain, none of the suggested definitions has proven satisfactory. Dr. Beecher's separation is inaccurate and does not contribute toward a better understanding of the problem. As Dr. Hardy and his co-workers point out, Dr. Beecher has classified pain on the basis of the psychic response engendered by the particular circumstances under which the pain is experienced (i.e., in the laboratory or in the hospital bed). His use of the term experimental pain suggests that this is some sort of hothouse variety that has to do only with scientific inquiry.

Several years ago, Dr. Revici and I suggested that pain be separated into two types, defined as physiological and pathological. The advantage of these terms in understanding the fundamental differences between the two types of pain has become increasingly apparent, and their general acceptance would resolve many of the semantic debates such as the one that appeared in SCIENCE.

Physiological pain is induced when noxious external stimuli are applied with sufficient intensity to healthy intact tissues, having specific pain end organs. Such pain is a sensorial sensation, similar in every respect to other sensations such as sight, hearing, taste, touch, etc., each of which has its own specific end organs as well as transmission pathways and centers of reception in the brain, and serves to provide the organism with information regarding its surroundings. Physiological pain serves as a warning signal to the organism that the stimulus applied represents a threat to its tissues. Using the means immediately at its disposal, the organism normally responds to physiological pain by fleeing from or fighting off the noxious stimulus in an effort to maintain the integrity of its tissues.

Pathological pain originates within tissues whose metabolism has been deranged as the result of damage or disease. Such pain is thus a sign of existing injury rather than a warning to the organism of impending danger. The impulses that give rise to pathological pain appear to be transmitted from abnormal foci along pathways ordinarily transmitting other sensations such as touch, cold, heat, and physiological pain, as well as by way of the autonomic system. The organism responds to pathological pain by endeavoring to place the injured part at rest in order to protect it and thereby facilitate recovery.

It is evident that physiological and pathological pain are fundamentally different in their origin, transmission, and significance to the organism as well as in the responses they arouse. In view of these basic differences, it is obvious that methods of study developed for one will not be satisfactory for the other. While physiological pain is readily investigated under the experimental conditions of the laboratory, using normal tissues, it is more than a laboratory reality. Pathological pain existing only in relation to diseased or damaged tissues is most effectively studied in subjects in whom such lesions exist. Our own studies have been concerned with the character of the metabolic changes within abnormal tissues that give rise to pathological pain.

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Book Reviews

Flying Saucers. Donald H. Menzel. Cambridge, Mass.: Harvard Univ. Press, 1953. 319 pp. Illus. $4.75.

In these days when we are regularly having our attention called to articles and books claiming that the flying saucers are interplanetary space ships and are receiving circulars offering for sale pictures, purporting to be photographs of flying saucers, it is refreshing to see a book which makes a sensible interpretation of the oft repeated stories.

Dr. Menzel begins with stories of "saucers" and strange lights since the present scare started in 1947. He shows the difficulty of explaining these old stories by pointing out that nearly all give estimated size and distance, although any trained person should know that he cannot tell how far away such an object is. He checked one story and found it necessary to change date, direction of motion, and other details. He gives another story as follows: ". . . on February 9, 1913. A great procession of slowly moving meteors moved diagonally across the United States and Canada, from Saskatchewan to Bermuda." This sensational story is based on nothing more than a fine shower of shooting stars in the Toronto area, a very few fireballs or shooting stars observed in other places, and practically nothing from the United States.

In spite of errors and exaggerations in the stories, Dr. Menzel gives plausible, although not always complete, explanations, for all reports discussed. He makes considerable use of mirages, sundogs, and other phenomena of meteorological optics, and devotes several dozen pages and some notes in the appendix to these phenomena. On the much advertised green fireballs, he comments, correctly, "Any astronomer who avers that green meteors are new, or that the color must come from burning copper, cannot be much of an authority."

Readers will find the pages on hoaxes, and on the