A theory to explain this behavior of the insects is as follows. Doubtless each individual insect has a normal tendency to flash at approximately equal intervals, these intervals being nearly the same for many different individuals of the swarm. Suppose that in each insect there is an equipment that functions thus: when the normal time to flash is nearly attained, incident light on the insect hastens the occurrence of the event. In other words, if one of the insects is almost ready to flash and sees other insects flash, then it flashes sooner than otherwise. On the foregoing hypothesis, it follows that there may be a tendency for the insects to fall in step and flash synchronously.

Everybody knows the flashing electric glow lamps for advertising and for warning signals. Some of these of longer period (five or ten seconds) have apparatus in which a condition (like the heat expansion of a core by an electric heating coil) builds up with time until it causes a flash which wipes out that condition, which then begins and builds up anew, and so on. Let us have a number of such lamps on a bench with their periods nearly, but not exactly, the same. Suppose that with each lamp there is a respective photoelectric cell connected to intensify the said condition (as by increasing the electric current in the heating coil) when light falls on the cell. First, screen the lamps from each other; there will be no sustained synchronism. Next, remove the screen; with suitable adjustment of the apparatus, the lamps will fall in step and flash in synchronism.

Consider two flashing lamps (or insects) A and B of periods slightly different, A having the shorter period. Eventually there will come a time when B's normal flash will be promptly after A's flash. Thereafter, were it not for the photoelectric cell (or in the case of the insect, the special equipment assumed by the present theory), B would flash later and later compared with A. But because of the cell (or equipment), B is accelerated each time enough to keep it in step with A. Further development of the principle here involved could be reached by extending the discussion to cases of three or more units.

An individual flashing firefly should be confined and its approximate period ascertained by observation, then a light should be flashed in its presence at a period slightly less; would the firefly fall into step? Various intensities and kinds of light should be tried.

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PRESSURE IN A FLUID

W. H. PIELEMEIER proposes in the issue of SCIENCE for April 25 that the concept of pressure potential be introduced, in the treatment of hydrodynamics. It seems to me that he has misconceived the nature of pressure. He states that according to the defining equation, $p = F \div A$, pressure is a vector quantity. This is not the case. In the equation F is a vector normal to the surface, and A is a vector in the same direction. The quotient is a scalar quantity. p is therefore a scalar. Inasmuch as we have already the potential function represented by the product of pressure and the specific volume of the fluid, it seems unnecessary to introduce another potential function so closely related to the one already in use.

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LAWS OF ORBITAL MOTION

RECENT correspondence has directed my attention to a law of planetary distances given in SCIENCE for April 5, 1929, by Professor Caswell, who states that so far as he is aware the relation has not hitherto been reported.

As a matter of fact, the law was enunciated by me ten years ago, in *The Observatory,* No. 545, November, 1919, and was shown to apply not only to the Sun and planets but also to systems of satellites.

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SPECIAL CORRESPONDENCE

BARRO COLORADO ISLAND BIOLOGICAL STATION

DR. THOMAS BARBOUR, chairman of the executive committee of the Barro Colorado Island Biological Station in the Panama Canal Zone, has submitted to the division of biology and agriculture of the National Research Council the sixth annual report of the station, covering the period from March 1, 1928, to February 28, 1929.

Dr. Barbour reports that the following institutions have continued their annual $300 table subscriptions: American Museum of Natural History, Harvard University, Missouri Botanical Garden, Smithsonian Institution, Johns Hopkins University and the University of Michigan. He is also glad to be able to announce that the Carnegie Institution and the Field Museum of Natural History have joined the institutions that help support the station through table subscriptions. There should be more.

The total expenses for the year were $6,052.80, and the total income received was $6,489.45. This total was made up by table subscriptions, personal donations (among which Dr. Barbour's account for two thirds of the sum) and subsistence fees from scientific workers.

The station is given the advantage of various concessions made by the government officials of the Panama Canal Zone and several steamship and railway companies, which greatly lessen the traveling and other personal expenses of investigators. Particulars concerning transportation from the United States to the Canal Zone and expenses while at the station can be had by application to Dr. Thomas Barbour, Museum of Comparative Zoology, Cambridge, Massachusetts. Those planning to work at the station should state approximately when they expect to sail and from which port. In some cases return transportation can be arranged with the steamship company before leaving the United States. Passports are not required in the Canal Zone.

The governor of the Panama Canal issues to visiting scientists a complimentary annual card pass on the Panama Railroad and also a card authorizing purchases in the Panama Canal commissaries. The governor has also generously extended to the working scientists of the station and to their families the same rates at the Gorgas Hospital that apply to families of employes of the Panama Canal. These rates are extremely reasonable and the hospital facilities are excellent in every way. Dr. Barbour's report especially acknowledges the continued cooperation of government officials in every department. Without this constant willingness on the part of these officials to support the station, its maintenance would be far more difficult.

Much has been done during the year in the way of extending trails and of making repairs and additions to the building and material equipment of the station. The old dock has been replaced by a new one. The guest house has been given more ventilation and light. All the buildings have been repainted. Several interesting long-time experiments on termite resistance of various kinds of wood are under way.

Dr. Barbour has prepared a list of papers published since the opening of the station, presenting the results of work done at the station by visiting investigators. This list includes 118 titles. Conspicuous among these publications is the recent book of Dr. Frank M. Chapman entitled "My Tropical Air Castle." This is a charming and authentically informing book of Barro Colorado Island natural history.

During the past year sixteen investigators have worked at the station for varying lengths of time, and about one hundred other persons visited the island.

More financial help is needed by the station for material equipment of one kind and another, and for work to be done on trails and in connection with the buildings of the station. A few thousand dollars more available each year to the station would enable great improvements to be made in it, and afford greatly improved opportunities for the investigators. The cooperation of universities and biological organizations by table subscriptions is the simplest and most desirable way to effect the needed aid. In the meantime, thanks to the generosity of Dr. Barbour and others, the station offers a unique opportunity to those who would work in the American tropics.

VERNON KELLOGG,
Permanent Secretary
NATIONAL RESEARCH COUNCIL

SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN ELECTRICAL RECORDING MANOMETER

IT is frequently desirable when studying pressure changes in the circulatory and respiratory systems to be able to photograph simultaneously these pressure changes together with other variables on the same strip of film. Previous set-ups for this purpose demand a rather cumbersome optical system which is particularly disadvantageous because it interferes with the recording of other phenomena on the same film. The recording manometer here described possesses the advantages that it can be easily and cheaply constructed from available laboratory materials, is simple and can be used in conjunction with a multi-unit oscillograph, the other elements of which can be utilized for time lines and other desired records.

The constants as given are of course applicable only when used with oscillograph units similar to those employed here, but slight modifications in resistances would adapt it to any oscillograph or fairly high speed galvanometer.

The parts required consist of:

a. an ordinary blood-pressure mercury manometer
b. 900 ohm variable resistor
c. 1½ to 6 volts in dry cells
d. oscillograph or galvanometer
f. connection to resistance wire
g. glass tubing support for resistance wire
h, h, m. resistance wire No. 30 nichrome

The resistance wire is fastened to a length of drawn out glass tubing by means of small sealing-wax bridges. The tubing should be as small as possible and still be firm enough to keep the resistance wire