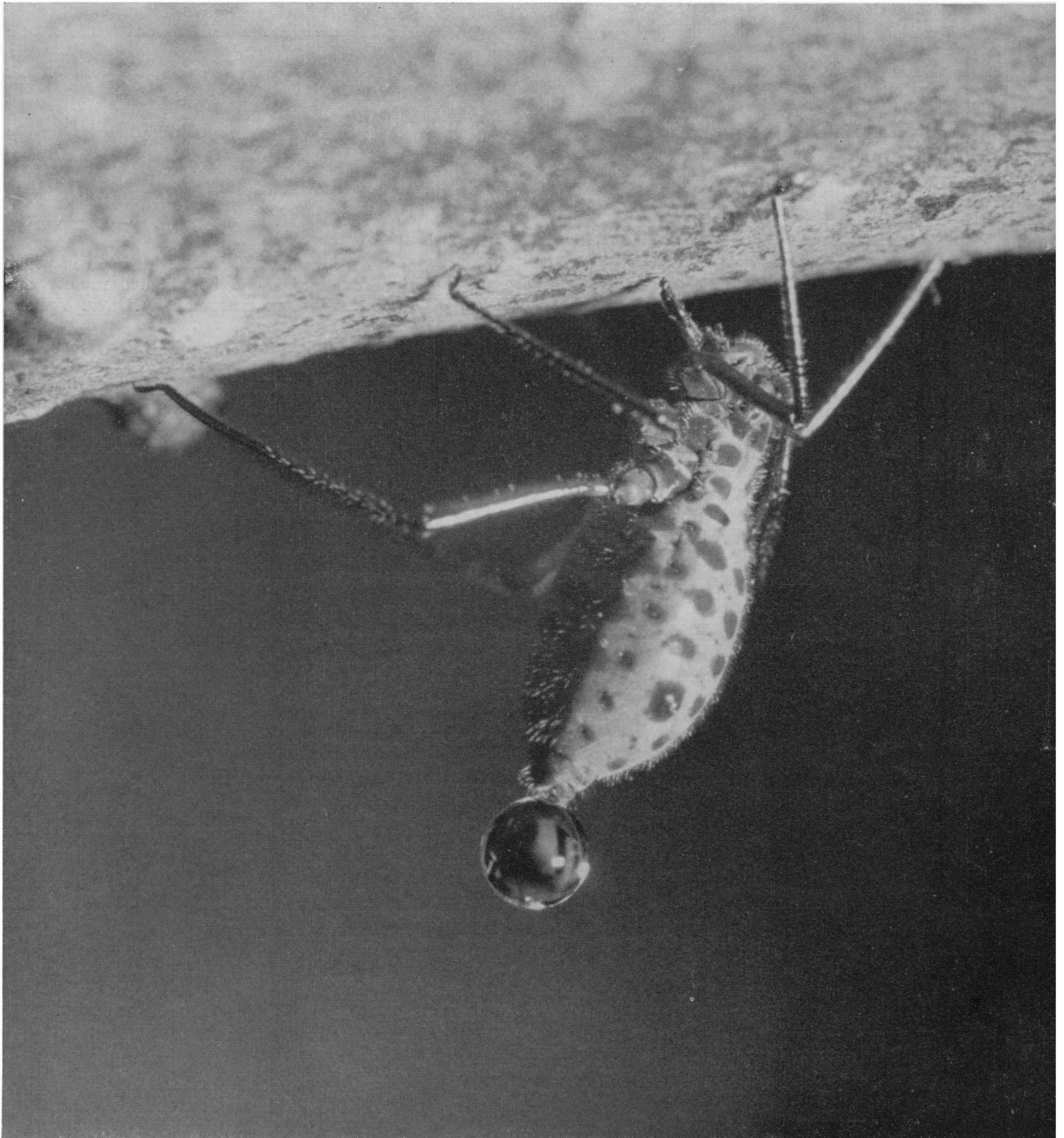


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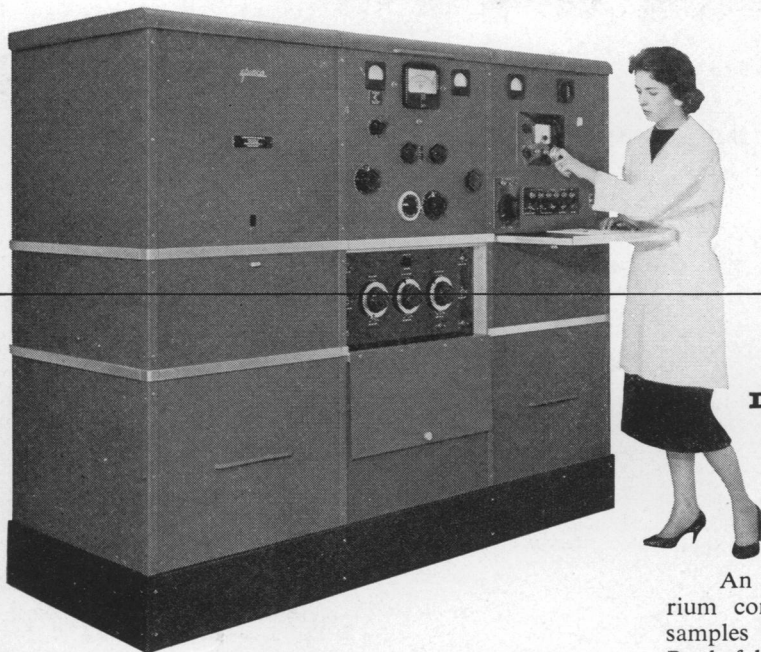
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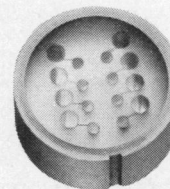


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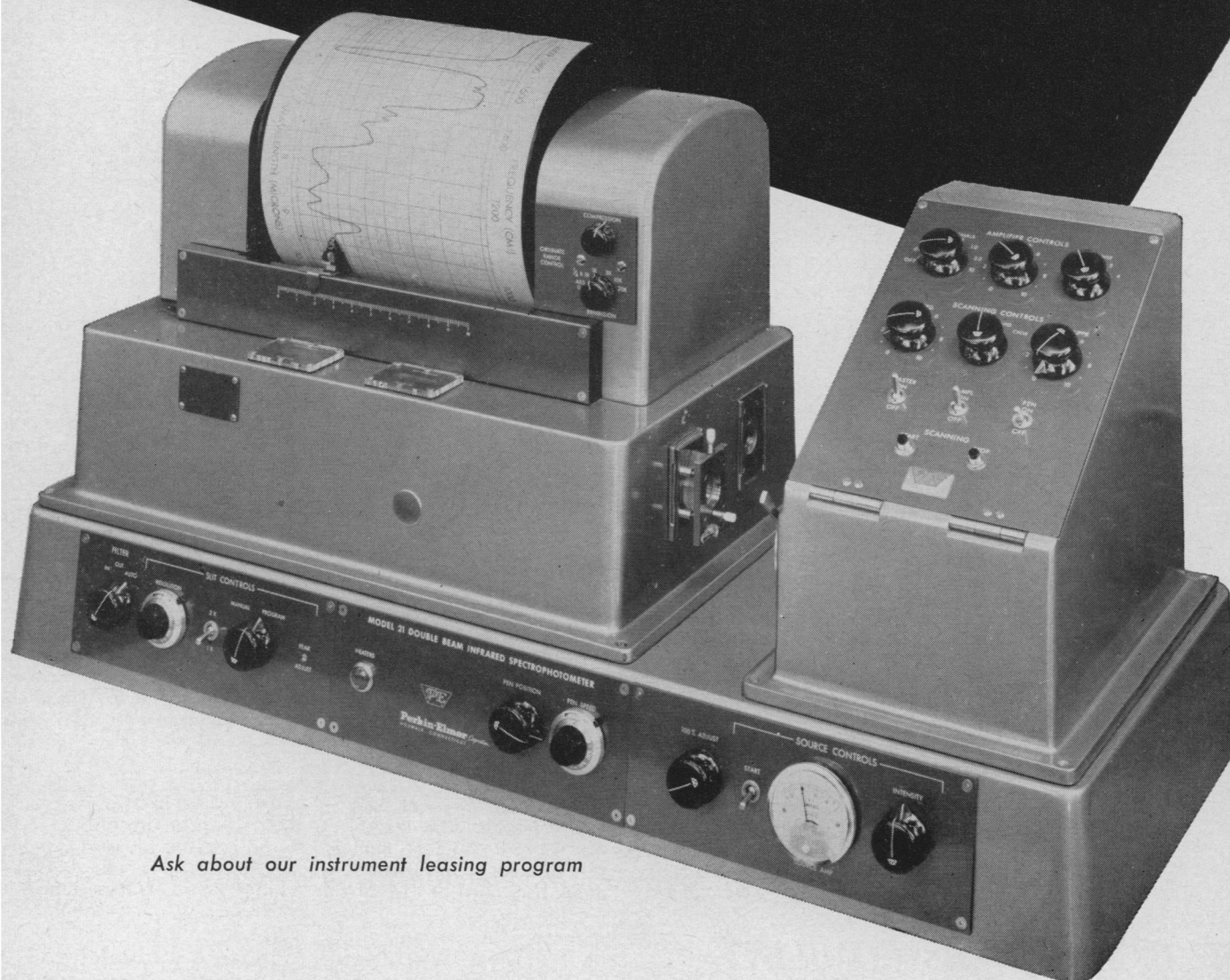
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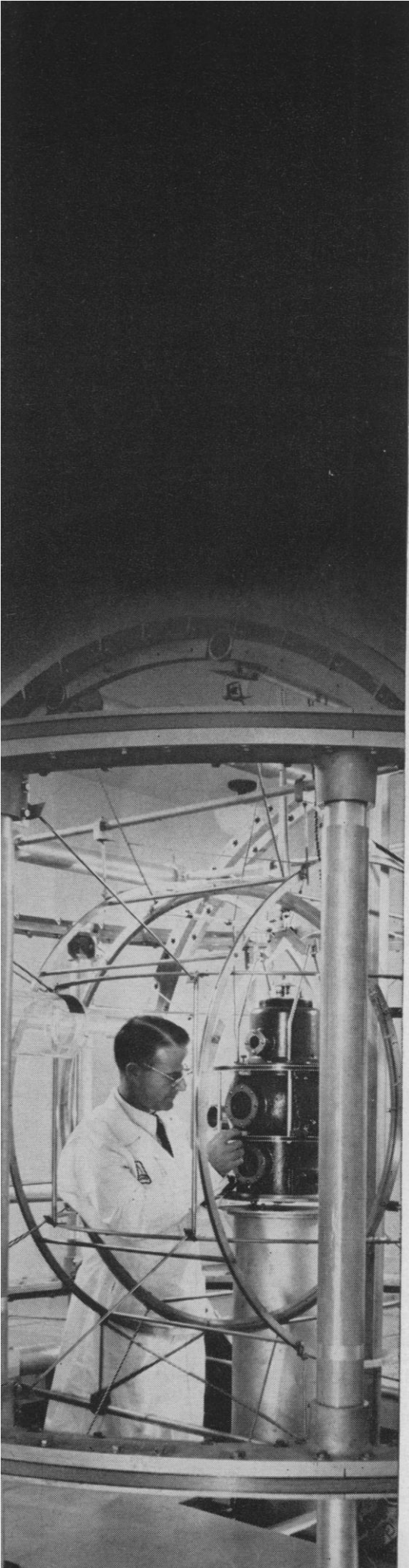
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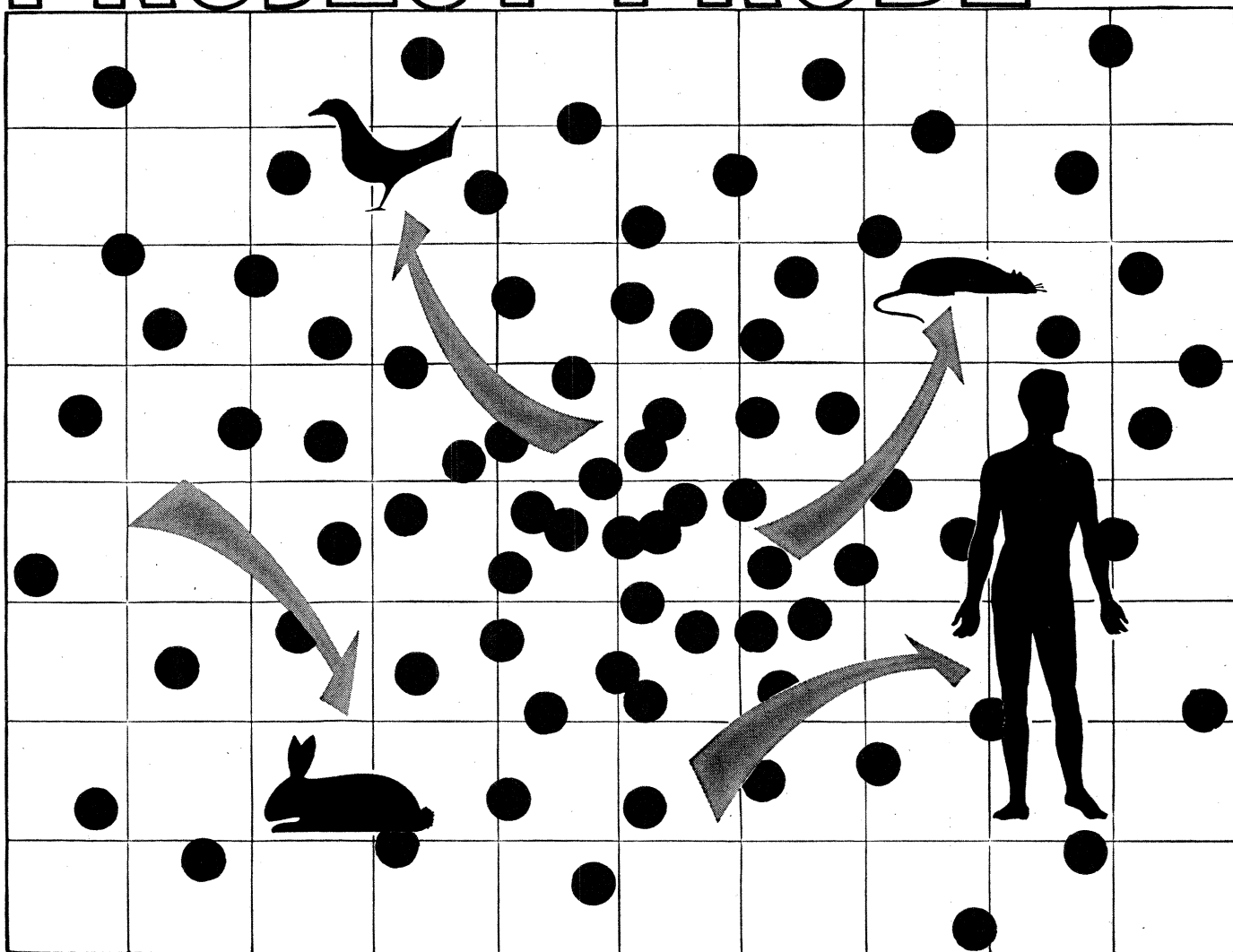
	<i>a</i>	<i>b</i>
Iron	1.92	1.90
Cobalt	1.85	1.83
Nickel	1.84	1.83
Supermalloy	1.91	1.91

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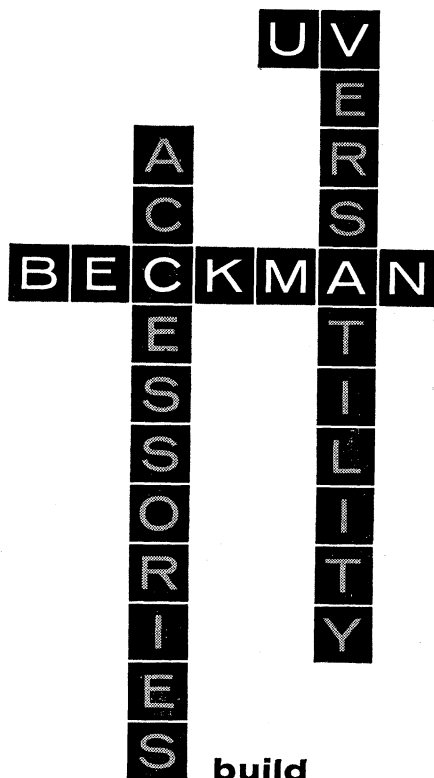
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MICHAEL B. SHIMKIN
National Institutes of Health,
Bethesda, Maryland

Progeny Yields in *Drosophila*

In a recent report by W. C. Levengood and M. P. Shinkle [*Science* **132**, 34 (1960)] regarding environmental factors influencing progeny yields in *Drosophila* it is stated that "atmospheric pressure effects on progeny yields . . . appear not to have been previously reported." Although comparatively little work has been done, there have been some publications applicable to the subject. For example, Stephen and Bird [*Can. Entomologist* **81**, 132 (1949)] studied some effects of different pressure levels on oviposition in the cabbage worm, *Pieris rapae*. Moreover, in reviews by Uvarov [*Trans. Entomol. Soc. London* **79**, 1 (1931)] and Wellington [*Can. J. Research* **24**, 51 (1946)] reference is made to Pictet's studies on pressure effects on emergence of *Pieris* adults. Although Levengood and Shinkle seem to have been concerned principally with numbers of progeny in their experiments, the observations by Pictet and by Stephen and Bird are directly applicable to experiments concerning progeny yields. Stephen and Bird found increased oviposition in insects exposed to relatively low pressures (900

to 930 mbar) as compared with that at higher pressures. Pictet reported that pressure changes might contribute to the success or failure of *Pieris* to emerge from the pupa. Parental oviposition and subsequent emergence from the pupal stage each may influence the final number of adult progeny. Incidentally, the results of Stephen and Bird (increased oviposition at lower pressures) do not support the data of Levengood and Shinkle (decreased number of progeny from matings during lower pressure).

Levengood and Shinkle also report results of rearings of *Drosophila* in an electrical "field." They found a lack of correlation between numbers of progeny and pressure level during mating, under the influence of the field. However, they do not give the amount of variability in the progeny data—a statistic which would aid in interpretation of these data, particularly since so much stress is placed upon this negative effect. The field presumably was developed through and around the culture medium. It would also have been helpful, therefore, if some indication of the dielectric capacity of the culture medium were given, since the dielectric capacity is inversely related to the field strength within the medium.

The authors appear not to have been too sure of the difference between an electrical field and an amount of electricity. For example, they state that the "electrostatic field strength was estimated to be 7×10^2 coul." But a coulomb expresses quantity of electricity, quite distinct from field strength per se. The latter should be expressed in terms of force (newtons) or electric intensity (newtons per coulomb) [J. A. Chalmers, *Atmospheric Electricity* (Pergamon, New York, 1957)]. As Chalmers stated, many authors refer to the electrical field of the atmosphere in terms of the potential gradient (volts per meter); the difference between the latter unit and electric intensity (E) is merely one of sign.

I am not clear on the meaning of the last two paragraphs of the report of Levengood and Shinkle. For example, in the sentence, "The electric field appears to provide a certain amount of protection and reduces the variations found outside the field"—variations in what? And in the sentence "Flies in the electric field are, in a sense, protected or shielded from external fluctuations," what external force is fluctuating? Are the authors referring in these two sentences to the natural, atmospheric electrical field? If they are, it seems to me that the field (potential gradient) within the laboratory building would not be important any-

(Continued on page 115)

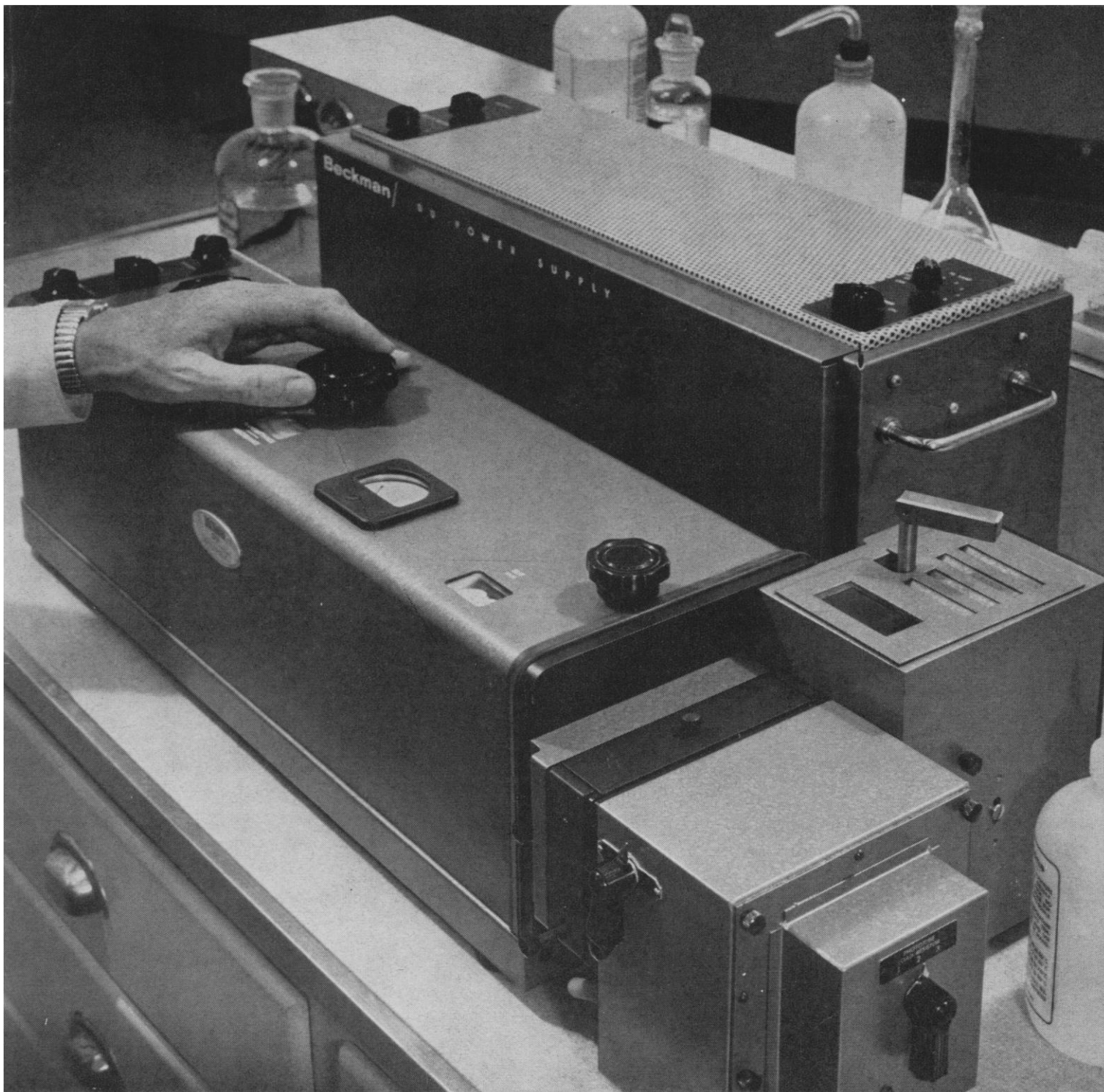


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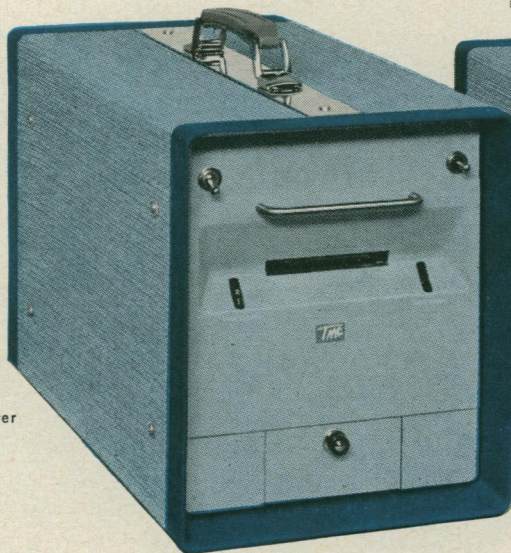
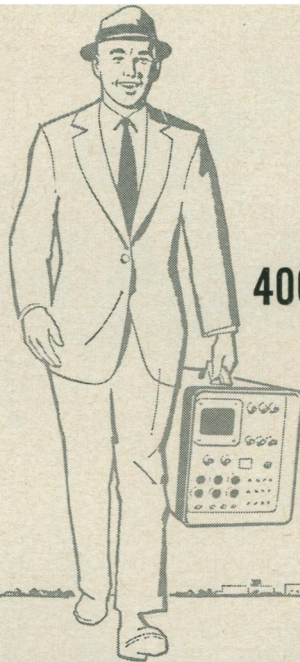
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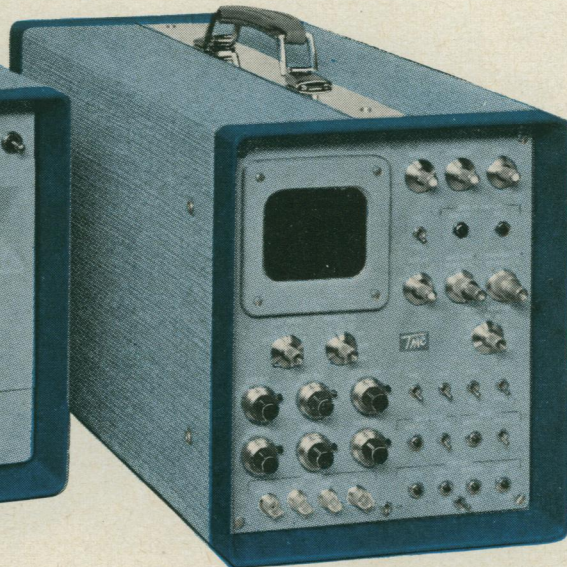
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A Strategy for Developing Talent

Our present policy for identifying and educating talented persons is, in good part, simply the mechanical product of our testing techniques, and there is good reason to question whether this policy is the best possible. Testing techniques, because of their use of certain statistical measures, tend to favor the broad scholar, the student with many interests and abilities. A more consciously directed program, however, might offer a different emphasis. This analysis and a new strategy based on it are given in Dael Wolfle's article on "Diversity of Talent" in *The American Psychologist*, August, 1960. The strategy is to increase our cultivation of persons who are not well-rounded, who are eccentric, one-sided, yet who, at least on that one side, are really superior. The claim is that such cultivation is valuable both from the viewpoint of the young persons whose future we guide and of the society in which they are to make their way.

There is nothing backhanded, according to the article, in the manner in which the broad, well-rounded student is favored by testing techniques. In selecting students for scholarships and fellowships and for admission to the next higher educational level, the present tendency is to use general measures of ability, to use the sum or the average of separate scores for separate types of ability, for example, rather than the separate scores directly. And there are good scientific reasons for this tendency. The use of sums or averages gives the best correlation between test scores and later achievement. Our measures of achievement in life, for the most part, are composites of several factors, and they are best predicted by tests that are also composites of several factors.

Good scientific grounds, however, may also be offered for not letting a concern with degree of correlation dominate talent development. For one thing, so the analysis continues, although different kinds of ability are often associated with one another, the association is far short of perfect. Some psychologists hold that a small number of primary abilities is sufficient to describe human ability, others find that a great number of special abilities is needed for this purpose, but all are agreed that ability is not a single, undivided trait. Another point about which psychologists are generally agreed is that an assortment of patterns of ability is consistent with achievement in a given profession. There has been a search for characteristic patterns of ability for various professions and it has failed. This means, according to the present analysis, that medicine, law, engineering, various branches of science, and other vocations all will profit by embracing diverse patterns of ability.

The strategy proposed, of course, does not call for slackening in the attention paid to the student who scores high everywhere. This student would get the same support he now gets, but attention would also be paid to the person who is exceptional in only one area. The strategy might mean poorer correlation between tests and subsequent achievement. The bet is, however, that it is a more productive way to increase the talent pool than simply to dip below the generally superior level, continuing to base awards on averages. In fact, the bet is that the strategy will enlarge the talent pool without loss in over-all quality. Students who, because of high gifts and intense interests along one line of endeavor, have neglected other lines would themselves no longer be neglected.—J.T.

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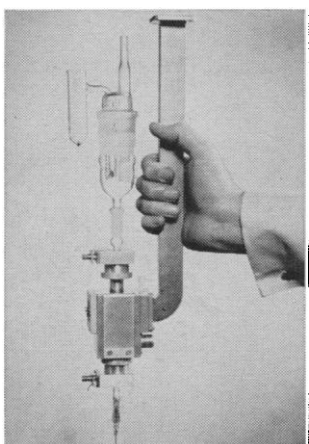
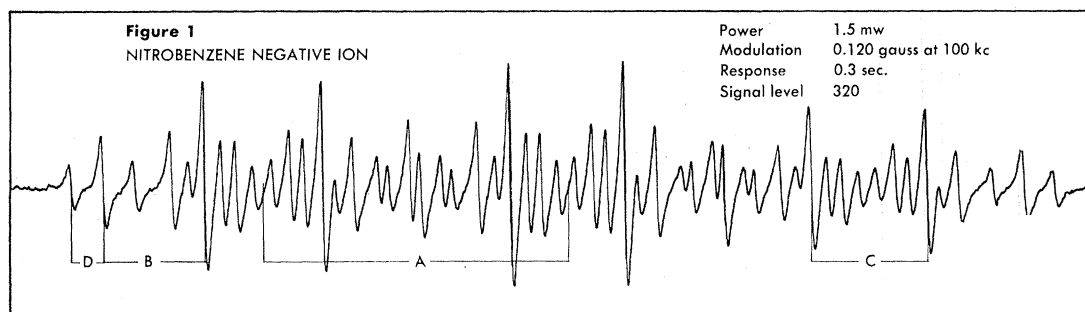


Figure 2 Electrochemical cell as used with the spectrometer

Recently Maki and Geske¹ reported a radically new and important application of EPR. They showed that it was now possible to observe directly the one electron transfer process in the electrolytic reduction of nitrobenzene to the negative ion. They prepared the negative ion by constant potential electrolysis of nitrobenzene in a solution of acetonitrile with tetra-*n*-propylammonium perchlorate as supporting electrolyte. Such methods of production of negative ions are preferable to the metal reduced systems in that the EPR spectrum can be interpreted completely without complication of interaction by the metal.

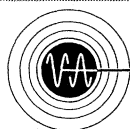
Figure 1 shows the spectrum of the nitrobenzene negative ion when generated from a solution of benzonitrile and tetra-*n*-propylammonium perchlorate². Forming the ion in benzonitrile seems to improve the resolution of the spectrum obtained. The predicted 54 lines are easily observed.

Splitting (A) represents the nitrogen coupling constant which is 10.3 gauss. Splitting (B), (C) and (D) correspond to the coupling constants of the ortho, para and meta hydrogens. The electrochemical cell used in the generation of the negative ions is illustrated in Figure 2 and is a modification of the V-4548 aqueous sample cell accessory.

¹ JACS 82, 2671 (1960).

² Sample donated by Dr. R. Adams, University of Kansas.

For literature which fully explains the 100 kc EPR Spectrometer and its application to basic and applied research in physics, chemistry, biology and medicine, write the Instrument Division.



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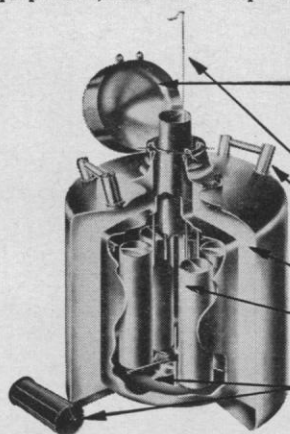


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Forthcoming Events

January

24-27. Society of Plastics Engineers, 17th annual conf., Washington, D.C. (T. A. Bissell, SPE, 65 Prospect St., Stamford, Conn.)

25-27. Mathematical Assoc. of America, annual, Washington, D.C. (H. L. Alder, Dept. of Mathematics, Univ. of California, Davis)

26-27. Western Spectroscopy Conf., 8th annual, Pacific Grove, Calif. (R. C. Hawes, Applied Physics Corp., 2724 S. Peck Rd., Monrovia, Calif.)

27-28. Royal College of Physicians and Surgeons, annual, Ottawa, Ontario, Canada. (T. J. Giles, 150 Metcalfe St., Ottawa)

28-30. Control of the Mind, symp., San Francisco, Calif. (Dept. of Continuing Education in Medicine, Univ. of California Medical Center, San Francisco 22)

28-31. Infertility, sectional meeting, Intern. Fertility Assoc., Acapulco, Mexico. (M. L. Brodny, 4646 Marine Dr., Chicago 40, Ill.)

29-3. American Inst. of Electrical Engineers, winter meeting, New York, N.Y. (E. C. Day, AIEE, Technical Operations Dept., 33 W. 39 St., New York 18)

30-3. Clinical Cong. of Abdominal Surgeons, Miami Beach, Fla. (B. F. Alfano, 663 Main St., Melrose 76, Mass.)

30-4. American Library Assoc., mid-winter meeting. (Mrs. F. L. Spain, New York Public Library, 20 W. 53 St., New York, N.Y.)

31-4. American Assoc. of Physic Teachers, New York, N.Y. (F. Verbrugge, 135

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31-4. American Physical Soc., annual, New York, N.Y. (K. Darrow, APS, Columbia Univ., 116th St. and Broadway, New York)

February

1-3. Solid Propellant Rocket Conf., American Rocket Soc., Salt Lake City, Utah. (R. D. Geckler, Aerojet-General Corp., P.O. Box 1947, Sacramento, Calif.)

1-3. Winter Military Electronics Conv., 2nd, Inst. of Radio Engineers, Los Angeles, Calif. (A. N. Curtiss, IRE Business Office, 1435 S. La Cienega Blvd., Los Angeles 35)

1-4. American Physical Soc., annual, New York, N.Y. (K. K. Darrow, APS, 538 W. 120 St., New York 27)

2-4. Congress on Administration, 4th annual, Chicago, Ill. (R. E. Brown, American College of Hospital Administrators, 840 N. Lake Shore Dr., Chicago 11)

6-8. American Acad. of Allergy, 17th annual, Washington, D.C. (J. O. Kelly, 756 N. Milwaukee St., Milwaukee 2, Wis.)

6-8. Geodesy in the Space Age, symp., Ohio State Univ., Columbus. (W. A. Heiskanen, Ohio State Univ., 1314 Kinross Road, Columbus 12)

6-10. British Medical Assoc., annual, Auckland, New Zealand (E. Grey-Turner, B.M.A., Tavistock Sq., London, W.C.1)

9-15. Second Allergy Conf., Nassau, Bahamas. (I. M. Wechsler, P.O. Box 1454, Nassau)

13-16. American Soc. of Heating, Refrigerating and Air-Conditioning Engineers, Chicago, Ill. (R. C. Cross, 234 Fifth Ave., New York 1)

14-15. Conference on Microdosimetry, 2nd, Rochester, N.Y. (N. Kreidl, Bausch & Lomb Optical Co., Inc., Rochester 2)

15-17. International Solid-State Circuits Conf., Philadelphia, Pa. (J. J. Suran, Bldg. 3, Room 115, General Electric Co., Electronics Park, Syracuse, N.Y.)

16-18. Biophysical Soc., annual, St. Louis, Mo. (W. Sleator, Dept. of Physiology, Washington Univ., St. Louis 10)

22-25. American Educational Research Assoc., annual, Chicago, Ill. (G. T. Buswell, 1201 16th St., NW, Washington 6)

23-25. American Orthopsychiatric Assoc., annual, New York, N.Y. (Miss M. F. Langer, 1790 Broadway, New York 19)

23-25. Fifteenth Annual Symp. on Fundamental Cancer Research, Houston, Tex. (Publications Dept., Univ. of Texas M.D. Anderson Hospital and Tumor Inst., Texas Medical Center, Houston 25)

23-25. Symposium on Molecular Basis of Neoplasia, Houston, Tex. (Publications Dept., Texas Medical Center, Houston 25)

26-1. American Inst. of Chemical Engineers, natl., New Orleans, La. (F. J. Van Antwerpen, AIChE, 25 W. 45 St., New York 36)

26-2. American Inst. of Mining, Metallurgical, and Petroleum Engineers, annual, St. Louis, Mo. (AIME, 29 W. 39 St., New York 18)

27-3. Conference on Analytical Chemistry and Applied Spectroscopy, 12th, Pittsburgh, Pa. (L. P. Melnich, U.S. Steel Corp., Monroeville, Pa.)

(See 16 December issue for comprehensive list)

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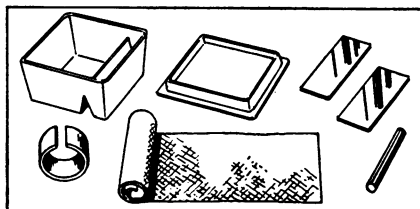



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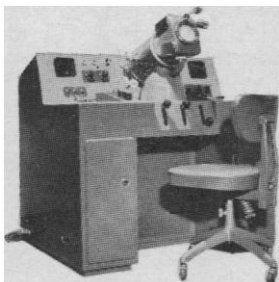


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appendixes. The decay-rate calculator is a circular-disk type that provides information on remaining activity when half-life and original activity are inserted. The handbook and the calculator are both available free of charge in small quantities. (Atomic Energy of Canada Ltd., Dept. Sci12, Commercial Products Div., P.O. Box 93, Ottawa, Can.)

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JOSHUA STERN

National Bureau of Standards,
Washington, D.C.

13 JANUARY 1961

Letters

(Continued from page 68)

way, due to the Faraday effect of the building. If the authors found that there was a field within the building, there would still be a Faraday effect applicable to the culture medium within the bottles.

In experiments to study progeny yields one should also consider the factors which affect behavior and oviposition of the parents, in addition to those factors which might act on larval development. In this regard, one of

the "unknown factors" Levengood and Shinkle associated with barometric pressure changes might be air ions. Air-ion densities are known to change with different kinds of weather, and I have found that positive air ions can influence the activity of adult blowflies.

DONALD K. EDWARDS
Forest Biology Laboratory, Canada
Department of Agriculture, Victoria

We would first like to comment on Edward's question concerning variability in progeny yields from cultures subjected to the influence of the electric field. The 16 cultures in the elec-

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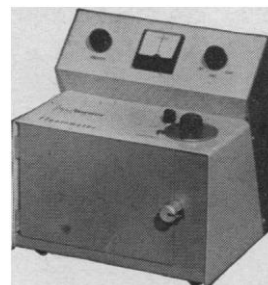
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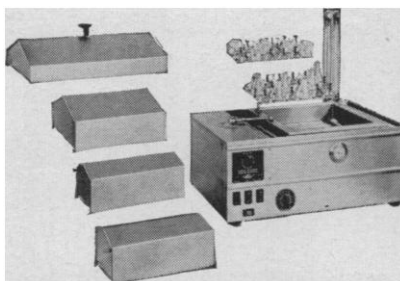
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tric field disclosed a mean deviation of 32.3 percent, whereas the control-group data showed a mean deviation of 52.4 percent. Also, the average progeny yield of flies grown in the electric field was 35.4 percent higher than the average for the control groups. When we made the statement that the electric field appears to provide a certain amount of protection we were, of course, referring to this decrease in variation and increase in progeny yield from cultures within the electric field. These figures were not included initially, due to the inevitable discrepancy between the al-

lotted space and the amount of information one wants to provide.

We feel that the outer envelope of glass (the culture bottle) is the most important factor in reducing the field strength. The dielectric constant of glass varies between 5 and 10, and in our calculations we used a value of 8 to be on the high side. The magnitude of the electrostatic field approximated from the physical dimensions is 7×10^{-9} coul; the exponent was inadvertently changed from -9 to 2 when the manuscript was initially compiled. If Edwards prefers that the field be expressed

in terms of electrostatic field intensity, then it is again necessary to make approximations because of shape factors. The general field intensity in which the bottles were placed was about 2.5×10^5 v/m. The directional field may be of sufficient strength to produce ionic drift toward the electrodes and decrease the density of air ions within the bottles. The effects of ions with known specific charges on physiological processes have been previously reported by Krueger *et al.* [*Proc. Soc. Exptl. Biol. Med.* **102**, 355 (1959)].

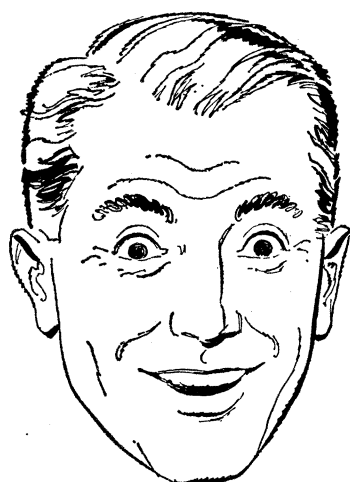
Ionizing radiation produced by cosmic rays is known to affect the electric and geomagnetic fields surrounding the earth. These fluctuating electric-field effects at high altitudes are believed to influence the production of less energetic ions at the earth's surface. The ionization at lower altitudes is also affected by barometric pressure, and the increase in ionization with decreasing pressure is an absorption effect. It is conceivable that this increase in ionization with decreasing barometric pressure could account for the pronounced decrease in the progeny yields from control cultures. It is these air-ion effects which we feel are significant in causing the variations, and not a Faraday effect as suggested by Edwards.

In reviewing the literature, no reference could be found pertaining to the effects on *Drosophila melanogaster* of varying barometric pressure. Pictet (1904-21) makes no reference to *D. melanogaster* but mentions only emergence of adult insects from pupal tissues. He mentions that the majority of adults emerge on the fall of the barometer; this could be explained possibly by brittle pupal cases, the result of greater evaporation of liquids at the lower pressure. This has nothing to do with matings in *Drosophila*. Also, Parman has stated that adult insects seem to emerge during periods of high pressure [D. C. Parman, *J. Econ. Entomol.* **13**, 339 (1920)]; thus, the effect of pressure on emergence appears to be in question.

As Edwards stated, Stephen and Bird observed an increase in oviposition in *Pieris rapae* at low pressures; however, an aspirator was used to produce the variations in pressure. This creation of artificial pressure variations would not correlate with changes such as air-ion variations occurring with natural fluctuations in atmospheric pressure. Also, these experimenters consider only one stage in the life cycle of the insect, whereas our experiments are based on complete life cycles of a number of generations of *D. melanogaster*.

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