The chairman of the Committee on Exhibits is William O. Baker, vice president for research, Bell Telephone Laboratories; he was a member of the same committee when the AAAS met in New York in 1956.

The chairman of the Committee on Public Information is Marion Harper, Jr., president of McCann-Erickson, Inc.; he headed the same committee at the previous New York meeting.

The chairman of the Committee on Physical Arrangements is Harry A. Charipper, head of the department of biology, New York University, Washington Square Center, who aided that committee in 1949 and 1956; he is also in charge of local arrangements for this year’s meeting of the American Society of Zoologists.

Housing

Four of the five hotels for the AAAS meeting have established uniform flat rates, much lower than their usual rates, for AAAS members and others attending the meeting. Thus, everyone who makes room reservations through the AAAS Housing Bureau can be assured of substantial savings.

Beginning with this issue, the advertising pages of Science will carry, at frequent intervals, announcements of hotel accommodations and rates, together with a coupon which should be filled out and sent, not to any hotel directly, but to the AAAS Housing Bureau in New York. All applications for hotel rooms will be filled in the order of receipt. Those who apply early are assured of accommodations in the hotel of their first choice. Expenses can be reduced still further if two people share a room or if three or more people share a suite. Upon request, all hotels will place comfortable rollaway beds in rooms or suites at $3 per night.

Registration

Both the technical, or program, sessions and the special sessions are open to all interested persons. Although registration for these sessions is not mandatory, it is expected that all who attend will wish to pay the AAAS registration fee of $3 and thus contribute their proportionate share to the heavy expenses of the meeting. (The registration fee for the husband or wife of a registrait, if a second General Program is not required, is $1.)

Each registrant receives the General Program, convention literature, a listing in the Visible Directory of Registrants, and a Convention Badge; the latter assures him all privileges of the meeting, discounts on tickets of admission to tourist attractions, and the like. The badge is required for admission to the large-scale exhibits, the AAAS Science Theatre, the presidential reception, and the AAAS Smoker. Re
Advance registration ($3.50, since prepaid postage is included) has some decided advantages: Delay at the registration desks upon arrival is eliminated; since the General Program is sent out by first-class mail early in December, the advance registrant can determine at his leisure which events and sessions he particularly wishes to attend; and the registrant’s name is posted in the Visible Directory of Registrants as the meeting opens (the hotel room may be added later, by the registrant himself).

An announcement on advance registration, with a coupon, will also be found in the advertising pages of this issue and at intervals hereafter.

AAAS Headquarters
As stated in the Preliminary Announcement, for the AAAS as a whole, there will be coheadquarters hotels. The Commodore, with its large ballroom, will accommodate the evening events, general sessions, the AAAS business sessions, and the AAAS Pressroom. The Biltmore will house the AAAS Office, the Visible Directory of Registrants, the Annual Exposition of Science and Industry, and the AAAS Science Theatre. Each of the two hotels—located one and a half blocks apart, on two sides of Grand Central Station (they can be reached by underground passages through the station)—will have AAAS Main Registration—Information Center facilities.

The Commodore will also accommodate the American Society of Zoologists and Section N; the Biltmore will house the other biological and medical groups and some of the physical sciences as well. The Roosevelt will be headquarters for the American Astronomical Society, for the science teaching societies, and for the social and economic sciences. The Belmont Plaza is the headquarters hotel for geology and geography, Section H, the History of Science Society, and other organizations of the “L” series. At present, no sessions are scheduled in the Waldorf-Astoria, 49th Street and Park Avenue, but 400 of its sleeping rooms are available, at minimum rates.

A detailed list of the headquarters for each section and participating organization is given below, since it is an obvious convenience for each person attending the meeting to have this information before he applies for room reservations.

Other Hotel Headquarters
AAAS sections are listed alphabetically and societies are listed in the same sequence, by discipline. 
Commodore (2000 rooms), 42nd Street and Lexington Avenue.
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American Geological Institute, National Geographic Society.

American Society of Zoologists.

Federation of American Societies for Experimental Biology.


Biltmore (1000 Rooms), 43rd Street and Vanderbilt Avenue.

AAAS Office; Annual Exposition of Science and Industry; AAAS Science Theatre; Visible Directory of Registrants.

AAAS Sections A—Mathematics, B—Physics, G—Botanical Sciences, I—Psychology, N—Dentistry, and O—Agriculture.

American Mathematical Society, Association for Computing Machinery, Society for Industrial and Applied Mathematics.

American Astronautical Society, American Institute of Physics, American Meteorological Society, Sigma Pi Sigma.

American Association of Clinical Chemists.

Society of Systematic Zoology.

American Institute of Biological Sciences, American Society of Naturalists, Beta Beta Beta Biological Society, Ecological Society of America, Mountain Lake Biological Station, Nature Conservancy, Society for the Study of Evolution, Society of General Physiologists.

Botanical Society of America, Mycological Society of America, Torrey Botanical Club.

Alpha Epsilon Delta, American Physiological Society, American Psychiatric Association.

American College of Dentists; American Dental Association; International Association for Dental Research, North American Division.

Society for Industrial Microbiology.

American Geophysical Union.

Roosevelt (1100 rooms), 44th Street and Vanderbilt Avenue.

AAAS Cooperative Committee on the Teaching of Science and Mathematics.


American Chemical Society.


National Association of Biology Teachers.


Engineers Joint Council, Engineering Manpower Commission, Tau Beta Pi Association.

American Association of Colleges of Pharmacy; American College of Apothecaries; American Pharmacaceutical Association, Scientific Section; American Society of Hospital Pharmacists; National Association of Boards of Pharmacy.

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AAAS Sections E—Geology and Geography, H—Anthropology, and L—History and Philosophy of Science.


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Forthcoming Events

August


15—25. Chemistry of Natural Products, IUPAC symp., Melbourne, Canberra, and Sydney, Australia. (Convener, Symposium Organizing Committee, Box 4331, G.P.O., Melbourne)

15—25. International Geological Cong., 21st session, Copenhagen, Denmark. (IGC, Mineralogical-Geological Museum, Univ. of Copenhagen, Øster Boldgade 7, Copenhagen K)


15—25. Sedimentology Cong., 6th intern., Copenhagen, Denmark. [General Secretary, IAS, 6/0 Institut Français du Petrole, 4, place Bir Hachem, Rue-Malmaison (Seine-et-Oise), France]


17—19. University Nuclear Reactors, Gatlinburg, Tenn. (University Relations Div., Oak Ridge Inst. of Nuclear Studies, P.O. Box 117, Oak Ridge, Tenn.)


18—19. Submarine and Space Medicine, 2nd intern. symp., Stockholm, Sweden. (H. Bjurstedt, Laboratory of Aviation Medicine, Karolinska Institutet, Stockholm, 60)

20. American Inst. of Ultrasonics in Medicine, Washington, D.C. (D. M. Stillwell, Dept. of Physical Medicine and Rehabilitation, Univ. of Colorado Medical Center, Denver 20)


21—25. American Soc. of Pharmacology and Experimental Therapeutics, Seattle, Wash. (H. Hodge, ASPET Dept. of Pharmacology, Univ. of Rochester, Rochester, N.Y.)


21—26. Physical Medicine, 3rd intern. conf., Washington, D.C. (W. J. Zeiter, 2020 E. 93 St., Cleveland, Ohio)

21—6. Pacific Science Cong., 10th annual conf., Honolulu, Hawaii. (Secretary-General, 10th Pacific Science Cong., Bishop Museum, Honolulu 17)


22—26. Plasma Physics, symp., Gatlinburg, Tenn. (University Relations Div., Oak Ridge, Inst. of Nuclear Studies, P.O. Box 117, Oak Ridge, Tenn.)

22—26. Western Resources, 2nd annual conf., Boulder, Colo. (M. E. Garnsey, Dept. of Economics, Univ. of Colorado, Boulder)


23—25. Cryogenic Engineering Conf., Boulder, Colo. (K. J. Timmerhaus, CEC, Dept. of Chemical Engineering, Univ. of Colorado, Boulder)


23—26. Institute of Mathematical Statistics, annual, Stanford, Calif. (W. Kruskal, Dept. of Statistics, Eckhart Hall, Univ. of Chicago, Chicago 37, Ill.)


24—27. Internal Medicine, 6th intern. cong., Basel, Switzerland. (Secretariat, 6th ICIM, 13 Steinentorstr., Basel)

24—2. International Union for the History and Philosophy of Science, Stanford, Calif. (R. Tatton, 64, rue Gay-Lussac, Paris 5e, France)
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25–27. Chemical Organization of Cells. 2nd conf., Madison, Wis. (J. F. A. McManus, Dept. of Pathology, Univ. of Alabama Medical Center, Birmingham)
27–30. International Union of Biological Sciences, section of embryology, Pal- lanza, Italy. (F. E. Lehmann, Kuhnweg 10, Berne, Switzerland)
28–31. American Phytopathological Soc., Green Lake, Wis. (W. B. Hewit, Dept. of Plant Pathology, Univ. of California, Davis)
28–31. Soil Conservation Soc. of America, Guelph, Ontario, Canada. (H. W. Pritchard, 838 Fifth Ave., Des Moines 14, Iowa)
28–1. American Inst. of Biological Sciences, annual, Norman, Okla. (H. T. Cox, AIBS, 2000 P St., NW, Washington 6)

The following 20 meetings are being held in conjunction with the AIBS meeting at Stillwater, Okla.

American Bryological Soc. (G. J. Ikenberry, Dept. of Botany and Plant Pathology, Oklahoma State Univ., Norman)
American Soc. of Plant Physiologists. (C. L. Linweber, Dept. of Botany and Plant Pathology, Oklahoma State Univ., Norman)
American Microscopical Soc. (R. W. Jones, Dept. of Zoology, Oklahoma State Univ., Norman)
American Soc. of Horticultural Science. (D. G. White, Dept. of Horticulture, Oklahoma State Univ., Norman)
American Soc. of Limnology and Oceanography. (T. C. Dorris, Dept. of Zoology, Oklahoma State Univ., Norman)
American Soc. of Plant Taxonomists. (U. T. Waterfall, Dept. of Botany, Oklahoma State Univ., Norman)
American Soc. of Zoologists. (R. W. Jones, Dept. of Zoology, Oklahoma State Univ., Norman)
Biometric Soc. (ENAR). (C. Marshall, Dept. of Statistics, Laboratory, Oklahoma State Univ., Norman)
Botanical Soc. of America. (W. W. Hanson, Dept. of Botany and Plant Physiology, Oklahoma State Univ., Norman)
Ecological Soc. of America. (A. Stebler, Oklahoma Cooperative Wildlife Research Unit, Oklahoma State Univ., Norman)
Genetic Soc. of America. (H. Bruneau, Dept. of Zoology, Oklahoma State Univ., Norman)
Mycological Soc. of America. (J. E. Thomas, Dept. of Botany and Plant Physiology, Oklahoma State Univ., Norman)
National Assoc. of Biology Teachers. (T. Overmire, 1709 Admiral Rd., Stillwater, Okla.)
Nature Conservancy. (A. Stebler, Oklahoma Cooperative Wildlife Research Unit, Oklahoma State Univ., Norman)
Phi Sigma Soc. (D. E. Howell, Dept. of Entomology, Oklahoma State Univ., Stillwater)
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29–3. International Cong. on Low Temperature Physics, Toronto, Canada.
(IUPAP, 3, boulevard Pasteur, Paris 15e, France)
(L. G. Elliott, Atomic Energy of Canada, Chalk River, Ontario, Canada)
31–6. International cong. de Sociologie, 19th, Mexico City, Mexico. (C. C. Zimmer-
man, 200 Emerson Hall, Harvard Univ., Cambridge 38, Mass.)
31–7. Applied Mechanics, 10th intern. cong., Stresa, Italy. (F. Rolla, Consiglio
Nazionale delle Ricerche, Ufficio Relazioni Internazionali, Piazza della Sci-
enza 7, Rome, Italy)
31–7. British Assoc. for the Advance-
ment of Science, annual, Cardiff, South
Wales. (Secretary, BAAS, 18 Adam St.,

September
1–3. Nephrology, 1st intern. cong.,
Geneva and Evian, Switzerland. (G. Rich-
et, Hôpital Necker, 149 rue de Sèvres,
Paris 15e, France)
1–7. American Psychological Assoc.,
Chicago, Ill. (L. F. Carter, 249 Mantua
Rd., Pacific Palisades, Calif.)
1–7. Nutrition, 5th intern. cong., Wash-
ington, D.C. (M. O. Lee, 9650 Wisconsin
Ave., Washington 14)
2–5. Astronomical League, Haverford,
Pittsford, N.Y.)
3–10. International Cong. of Preventive
Medicine and Social Hygiene, 8th, Bad
Aussie, Austria. (A. Rottmann, Liechten-
steinstrasse 32/4, Vienna 9, Austria)
4–9. Cell Biology, 10th intern. cong.,
Paris, France. (M. Chévrement, Institut d'Histologie, 20, rue de Piteures, Liege,
Belgium)
4–9. Laurentian Hormone Conf., Mont
Travers, Quebec, Canada. (Arrange-
ments Committee, Laurentian Hormone
Conf., 222 Maple St., Shrewsbury, Mass.)
4–10. International Soc. of Orthopaedic
Surgery and Traumatology, 8th cong.,
New York, N.Y. (A. Baillieux, Société de Chi-
rurgie Orthopedique et de Traumatologie,
34, rue Montoyer, Brussels, Belgium)
4–10. 1st Cong. of Anaesthesiologists,
Toronto, Canada. (R. A. Gordon, 516
Medical Arts Bldg., Toronto 5)
4–14. International Societies of Hema-
atology and Blood Transfusion, 8th cong.,
Tokyo, Japan. (S. Murakami, Blood Trans-
fusion Laboratory, Japanese Red Cross
Soc., Shibuya, Tokyo)
5–7. Society for Biological Rhythm, 7th
conf., Siena, Italy. (A. Sollierberger, Dept.
of Anatomy, Caroline Inst., Stockholm 60)
5–9. Chemical Engineering (Czecho-
slovak Chemical Soc.), Prague, Czecho-
slovakia. (Technicka 1905, Prague-Dejvice,
Czechoslovakia)
5–10. Microbiology of Non-Alcoholic
Beverages, 5th intern. symp., Evian,
France. (D. A. A. Mossell, Intern. Assoc.
of Microbiological Societies, c/o Central
Inst. for Nutrition Research, Catherinje-
singel 61, Utrecht, Netherlands)
5–9. Medical and Small Power Reactors,
conf., Vienna, Austria. (International
Atomic Energy Agency, 11 Kärntner Ring,
Vienna 1)
conf., Aix-en-Provence, France. (Inter-
national Federation of Operational Research
Societies, 11 Park Lane, London, W.1)
5–12. International Soc. of Bioclima-
tology and Biometeorology, 2nd cong.,
London, England. (E. M. Glaser, Dept. of
Physiology, London Hospital Medical
College, Turner St., London, E.1)
5–15. International Scientific Radio
Union, England. (R. H. Smith-
Rose, Radio Research Station, DSIR, Dit-
ton Park, Slough, Bucks, England)
5–17. Photogrammetry, 9th intern. cong.,
Soc. for Photogrammetry, 18 Cavendish
Sq., London, W.1)
6–5. Nuclear and Radio-Chemistry,
symp., Chalk River, Ontario, Canada.
(R. H. Betts, Atomic Energy of Canada
Ltd., Chalk River, Ontario)
6–17. Use of Radioactive Isotopes in
the Physical Sciences and Industry, conf.,
Copenhagen, Denmark. (International
Atomic Energy Agency, 11 Kärntner
Ring, Vienna 1, Austria)
7–8. Canadian Textile Seminar, 7th,
Kingston, Ontario, Canada. (J. M. Merri-
man, Textile Technical Federation of
Canada, 223 Victoria Ave., Westmount,
P.Q., Canada)
7–9. Canadian High Polymer Forum,
10th. Ste. Marguerite, near Montreal,
Quebec, Canada. (D. A. I. Goring, CHPF,
Pulp and Paper Research Inst., McGill Univ.,
Montreal)
7–9. International Soc. of Geographical
Pathology, 7th conf., London, England. (J. S. Young, ISGP, c/o Dept. of Pathol-
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**Joshua Stern**

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Letters

Artificial Biosphere

It is unfortunate that Dyson's suggestion [Science 131, 1667 (1960)] as to how intelligent beings might survive after reaching "the limits set by Malthusian principles" does not do justice to the intelligence of these beings by explaining how they would overcome some of the obstacles which, at first sight, would seem to mitigate against their curious way of life.

Dyson's report describes a uniformly thick shell of fluid with a thickness of a meter or two and a radius twice the earth's distance from the sun. The shell is said to revolve about the central star, which implies that the material revolves as a whole. Presumably the material of the shell must be enclosed on both surfaces by transparent plastic sheaths of similar constructions, for self-gravitation cannot be expected to make the material cohere. However it is not conceivable that it would be possible to quarry from the material of a planet like Jupiter sufficient structural steel to keep the shell rigid against the shear forces and those that would tend to move material towards the equatorial plane.

Therefore, it must be assumed that radiation pressure must play a part in supporting the shell, so that its form will be that of an oblate spheroid rather than a sphere. For example, material at the poles of revolution of the shell would be supported entirely by radiation pressure, so that the polar radius of the shell would necessarily be less than the equatorial radius. However, a cursory calculation will show that this would be possible only at a distance from the central star comparable to but less than the radius of the sun.

Beings of lesser intelligence, not having discovered the appropriate laws of physics, might therefore seek some other distribution of their dismantled Jupiter that would have more intrinsic stability—for example, a torus lying in a plane perpendicular to the axis of its own rotation. The mass of Jupiter distributed in this way would yield a torus whose cross-sectional area was comparable with that of the moon, but unfortunately the flux of stellar radiation would be reduced by a factor of 10⁸.

With conventional laws of physics, however, as Laplace was the first to show, even this arrangement would not be stable, and it is to be expected that the material of the torus would coalesce into one or more planetary objects. This suggests that, in the present state of intelligence, the dispersal of Jupiter into a thin shell about the sun would
not be an effective means of escaping the consequences of continued population growth but that it might be an experiment with an important bearing on various theories of the origin of the solar system. It would, for example, be interesting to see whether the outcome of the experiment was the recreation of Jupiter or the creation of a number of asteroids.

Another point is that a search for infrared stars would be valuable even in conventional science for the light it might throw on the evolution of stars which are very young or very small as compared with the sun.

*John Maddox*

*Washington Post, Washington, D.C.*

Freeman Dyson's report suggesting that intelligent life elsewhere in the universe may be detected by looking for sources of infrared radiation was delightful. However, as an old science-fiction hand, I feel obliged to sound a cautionary note to the scientists. Or am I merely too dense to recognize a satire?

The basis of Dyson's argument is that an industrial culture may eventually occupy an artificial biosphere completely surrounding its sun, thus maximizing the territory and energy available for population expansion "to the limits set by Malthusian principles." The mass of Jupiter could be converted into an inhabited "spherical shell revolving around the sun at twice the Earth's distance from it." utilizing incident solar radiation which would be reradiated into space in the 10-micron band.

Offhand, I should think rotational and gravitational stresses alone would rule out such a structure of such dimensions. But since it is admittedly dangerous to assert that anything is impossible, I shall confine myself to questions of economics. Even Dyson intimates that the project would take several thousand years to complete; he calculates the energy required as equal to the sun's total output for eight centuries, and one does have to eat meanwhile. And meanwhile, too, the population growth necessitating this project will presumably continue. As Hauser remarks in the same issue [Science 131, 1642 (1960)], at our present-day rate of increase we would reach "a population of one person per square foot of the land surface of the earth in less than 800 years." Thus, the economic surplus needed for the biosphere project would be consumed long before the latter got well started.

If we assume a ratio of population increase to industrial expansion low enough so that this contretemps does not occur, we must ask ourselves how
any intelligent species could be induced patiently to continue this enormous task, millennium after millennium. True, our human history contains epochs of grandiose and useless construction, such as the pyramid building of Egypt, but they never lasted very long. Any revolutionist who promised relief from the crushing burden of the biosphere project would be well received! He could doubtless get support for some or other population-control program; those who demurred would be martyred by exasperated taxpayers, or the equivalent thereof.

Of course, the entire species might, by advanced psychological techniques, be conditioned into such an antlike state that its government could never be overthrown, or break down from internal stresses, or evolve into something new. But given subjects as meek as this, and no reason to breed vast armies (for only a well-established world government could seriously entertain these ideas in the first place), the masters could regulate birth and death by fiat. Thus, the population would be stabilized at some rational figure and projects such as Dyson’s would never be indicated.

In short, uncontrolled population growth will make the construction of artificial biospheres impossible, and control will make them unnecessary. So astronomical discovery of infrared sources won’t prove anything about the inhabitants of other planets.

POUL ANDERSON

3 Las Palomas Road, Orinda, California

The suggestion by Freeman J. Dyson for investigating solar far-infrared radiation as one way to detect extraterrestrial intelligence sounds quite practical and sensible.

This leads me to suspect that if Dyson’s assumption is correct—that intelligent beings exist of a far higher order of technological achievement than our own—it would be well-nigh impossible for such beings not to have detected us.

EUGENE A. SLOANE

“Air Engineering,” Detroit, Michigan

In reply to Maddox, Anderson, and Sloane, I would like only to add the following points, which were omitted from my earlier communication.

1) A solid shell or ring surrounding a star is mechanically impossible. The form of “biosphere” which I envisioned consists of a loose collection or swarm of objects traveling on independent orbits around the star. The size and shape of the individual objects would be chosen to suit the convenience of the inhabitants. I did not indulge in speculations concerning the constructional details of the biosphere, since the
spected emission of infrared radiation is independent of such details.

2) It is a question of taste whether one believes that a stabilization of population and industry is more likely to occur close to the Malthusian limit or far below that limit. My personal belief is that only a rigid "police state" would be likely to stabilize itself far below the Malthusian limit. I consider that an open society would be likely to expand by a proliferation of "city-states" each pursuing an independent orbit in space. Such an expansion need not be planned or dictatorially imposed; unless it were forcibly stopped it would result in the gradual emergence of an artificial biosphere of the kind I have suggested. This argument is admittedly anthropomorphic, and I present it in full knowledge that the concepts of "police state" and "open society" are probably meaningless outside our own species.

3) The discovery of an intense point source of infrared radiation would not by itself imply that extraterrestrial intelligence had been found. On the contrary, one of the strongest reasons for conducting a search for such sources is that many new types of natural astronomical objects might be discovered.

Freeman J. Dyson
Institute for Advanced Study,
Princeton, New Jersey

Hazards and Insecticides

Philip R. White states [Science 131, 614 (26 Feb. 1960)] that "the problem" is much wider than "poisoned cranberries," chickens, and so on; that "the problem" is a "premature or inadequately prepared commercialization of scientific finding." White fortifies his opinion with a few cases, stating that these must be only a few of hundreds. White has presented only one side of the coin. That certain cases do represent a very dangerous trend is true, but the reverse side of the coin may be equally dangerous.

Pray let me, like White, cite a few examples. In the last few years this laboratory has tested two chemicals that came to us from Europe, highly recommended. In both cases we found the materials ineffective although not in any way dangerous. One of these was already on the market in Europe but was withdrawn because our work proved it ineffective. This case parallels the case of the French weed killers cited by White.

In the 1930's Anopheles gambiae was rampant in the valley of Rio Grande do Norte in northeastern Brazil. Many scientists (altogether too many) stated dogmatically that it was impossible to eradicate these mosquitoes, that the misery, sickness, social disorders, and death visited upon Rio Grande do Norte were inevitable for the Western Hemisphere from Buenos Aires to Galveston. Fortunately a small group of scientists supported by the Rockefeller Foundation and the Brazilian Government staked their honor and reputations, but not their lives, in a scientific Thermopyle. They used the tools available—namely, pyrethrum of evanescent efficacy and paris green of extremely high toxicity. In 2 years morbidity cases among the field workers numbered 595. Compare this with statistics for the village of Caicó (some 600 inhabitants), where there were 64 fatalities in the month of May 1959 as a direct result of invasion by Anopheles gambiae. Anopheles gambiae was eradicated in the Western Hemisphere, although the only weapons available were ineffective or hazardous by present scientific standards. The incident is forgotten, although it has been fully published and the report is readily available for anyone's perusal [F. L. Soper and B. Wilson, Anopheles gambiae in Brazil (Rockefeller Foundation)].

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with a new and dangerous pest—namely, *Musca autumnalis* or face fly. This insect is very closely related to the house fly, but it differs in habits. It congregates on the face of cattle, and these miserable animals have no defense. Like its close relative the house fly, it is an extremely effective transmitter of certain disease organisms, such as staphylococci, salmonellae, coliforms, and other enteric bacteria. It even likes the face of man, particularly the corners of the lips. For two summers I have watched this pest on the cattle pastured almost in my back yard. They are miserable animals with sore eyes, and I do not for one minute suppose that their milk is of the highest or most nutritious quality. We have available insecticides which are safe by any reasonable standards, and effective. However, they may not be used legally on dairy cattle because of the fanatical attitude of certain federal officials. The face fly is spreading steadily in the northeastern United States, where nothing is done to control or to eliminate this disease-bearing pest. I wish to point out that this is a very dangerous trend. We are accepting an obvious and well-proved hazard because certain individuals with legal power dream of a possible hazard connected with the use of insecticides upon dairy cattle. We grant that certain insecticides can be dangerous, but there are available today effective drugs that are not hazardous from the scientific point of view. They have been very well studied, and while they cannot be declared absolutely innocent (the absolute has no place in science) they are, when used as insecticides, as innocent as sugar, salt, or milk itself. This is all that a relative science can do, for science can never be absolute.

White’s complaint, that insecticides used to control the fire ant are hazardous to wildlife, is out of proper reference. If permitted to spread throughout the southern United States, this pest species will destroy many wild species and their habitats. D. Hey, writing of Cape Providence, Union of South Africa, states, “particularly introduced forms as the Argentine Ant” have played their part in depletion of wildlife. Evidence of the same “depletion” is recorded for the United States. We should not trade temporary loss of a few species over a small area for permanent loss of many types over a much larger area.

As Francis Bacon stated years ago, we must be willing to accept new remedies, or we must prepare ourselves for new ills. The fire ant and the face fly are merely two of the many ills that presently affect us. I know of many more. They happen to be new to this part of the world, but there are old as well as new problems. These are scientific problems and they must be dealt with by scientific methods. This means that we must open our minds to the relative laws of science and bar therefrom the absolute nonsense that has created the cranberry scandal and is driving us toward a dairy debacle. Every new drug should be adequately tested by the relative laws of science in general and of biology in particular. The use of absolute dicta, of the philosophical zero, such as White seems to approve, will prove disastrous again as in the past. Science can never prove absolute safety—it can prove necessity and relative safety.

Generalization from such limited cases is of uncertain value; the conclusion that the problem is fundamentally biological seems unavoidable. Consequently, the solution must follow the laws of biological science. The virulent poisons produced by staphylococci and other pathogens are a part of the problem. Dogmatic regulations that contravene the laws of biology will prove dangerous and even disastrous. Safety must be defined in terms of biology and not in terms of a philosophical zero, an absolute mathematical formula, or an analytical procedure.

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**Electronic Brains?**

A few years ago the new electronic digital computing machines were often popularly referred to as electronic brains. However, this practice soon fell into disrepute among scientists and engineers. A cliché which developed said in effect, “A general-purpose digital computer is designed to carry out arith-

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Electrothermal elaboration, sense programmer, and any completely arithmetic cliche, explains on manifestation thinking pose. The able control and two search are specially with digital Uninsulated—Current-carrying surfaces. Heating tapes are heated of the dominant attitude of many scientific and engineering publications on both sides of the iron curtain. An elaboration, which often follows the cliche, explains that the sequence of arithmetic and logical operations is completely predetermined by a human programmer, and any appearance of thinking by the computer is merely a manifestation of the thinking of the human programmer. (The general-purpose digital computers do carry out sequences of arithmetic and logical operations as specified by the programmer, but the programmer may specify that the sequence shall vary as a function of the input variable [or sensory] data.)

These projections of their own ignorance by pseudo experts may be amusing to researchers who are daily engaged in mechanized-thinking experiments on general-purpose and special-purpose computers. However, a scientist seeking employment or approval for a new project from a director of a research laboratory may not find these negativistic attitudes at all amusing. Such negativistic statements are almost invariably followed by a challenge to demonstrate the mechanized-thinking process by deriving the general theory of relativity. This seems comparable to requiring the Wright brothers to prove that they could fly by flying nonstop around the world.

It may seem improbable that research directors would be so ill informed concerning subjects relevant to their work. However, this seems to be the rule rather than the exception. It would appear that prominent scientists and engineers should be more cautious about asserting that certain things cannot be done merely because they do not know, at the moment, of any feasible method. They not only leave themselves open to ridicule in many instances but may also hinder the progress of research, for the direction of scientific research may be greatly affected by a simple, negativistic, dogmatic, cliche.

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Conversions

Apropos the editorial on “Metric versus English units” [Science 131, 195 (22 Jan. 1960)] with its implications regarding conversions, I would like to call your attention to the reports on the Tiros [Science 131, 1031 (8 Apr. 1960)] and U.S.S.R. “space ship” [Science 131, 1510 (20 May 1960)] satellite launchings.

Apogee and perigee of the Tiros are given as 407.2 and 378.7 nautical miles, respectively. According to my conversion tables, 1 nautical mile equals 1.1516 statute miles. The corresponding apogee and perigee should be 468.9 and 436.1 statute miles. In the article they are given as 468.28 and 435.5 statute miles, corresponding to a conversion factor of 1.1500 statute miles per nautical mile.

Similarly, the announced weight of the Russian “space ship” was 4 tons, 540 kg. In the Science article this is given as 9988 pounds, corresponding to a conversion factor of 2.200 lb/kg. In fact, the conversion is 2.2046; the weight in English units is apparently 10,009 lb.

For the purposes of the articles in Science, accuracy in these details is probably not important. Nevertheless, there is a lesson to be learned about the simplicity of conversions within the metric system and about the retention of significant figures during and after conversions.