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M. C. Goodall
Institute for Biomedical Research,
American Medical Association,
535 North Dearborn Street,
Chicago, Illinois 60610

... What is apparently overlooked and totally ignored by these petitioners is that this [the war in Vietnam] is not an academic exercise divorced from life and death. It is a very real exercise in how to achieve a goal, however distasteful, with a minimum of casualties among our own combat personnel. I believe that any technique, weapon, tactic, or strategy that will minimize casualties among our combat personnel is right, and any technique, tactic, or strategy that preserves the combat effectiveness of our opponent is wrong.

Donald E. McCrary
Post Office Box 1297,
Mountain View, California 94042

Rothschild cites such nonlethal diseases as Venezuelan equine encephalitis, Q-fever, and dengue fever, and implies that biological weapons of this kind might humanize warfare. Unhappily, the developers of biological weapons do not limit their attention to diseases with low mortality. Although the Army’s microbiological laboratory at Fort Detrick has conducted considerable research on Venezuelan equine encephalitis virus, it is also interested in organisms a good deal less cuddlesome, including Pasteurella pestis (plague) and Bacillus anthracis (anthrax). The reason for this interest in highly virulent pathogens is perfectly obvious. The logic of military necessity requires that an enemy be destroyed, not given a case of sniffles. The military would be betraying its own responsibilities if it ignored this necessity.

There is, however, a crucial qualitative distinction between conventional explosive weapons and biological weapons, a distinction which underlies the concern expressed in the CBW petition. Conventional weapons can, at least in principle, be aimed. Even aerial bombardment can be carried out with a considerable degree of precision. With conventional weapons it is therefore possible to discriminate to a large extent between combatants and noncombatants. Such discrimination is demanded, not only by the humane principles which are supposed to justify our society’s reasons for engaging in warfare, but also by a body of international law ranging from the Hague Convention Rules of Land Warfare to the United Nations Genocide Convention of 1948.

But biological weapons cannot, in general, be used with such discrimination. There is no pathogen which is host-specific for military personnel. Crop destruction by plant pathogens (or, for that matter, by herbicides) is injurious to all, military and civilian, who require food. This unique aspect of biological warfare evidently escaped Silverman (Letters, 10 Mar.), who asks: “Why is it more horrible to be ill (even acutely ill for a period of time) than to be mangled or dead for all time?” First of all, this question conceals the assumption, as groundless here as in Rothschild’s letter, that biological warfare will eschew lethal diseases. Secondly, the relative charms of being victimized by a bomb or by an aerosol of P. pestis is not the point at issue. The point is that bombs can be aimed at military targets, while the dissemination of a plague among a whole population would be genocide.

Those of us who are concerned about CBW are not necessarily pacifists, any more than were the framers of the Hague Convention. Our concern is with the philosophy of our society. Rothschild points out, somewhat paradoxically, that “the amount of damage a nation will execute upon civilians...is defined by the philosophy of the nation using the weapons.” Precisely.

Jonathan Gallant
Department of Genetics,
University of Washington, Seattle

Congressional Witnesses

Marvin’s letter, “Pesticides: Overstated dangers” (7 Apr.), mentions an investigation conducted by the House Appropriations Subcommittee on Agriculture, chaired by Congressman Jamie L. Whitten (Mississippi), in which
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**RANGE OF APPLICATION**

<table>
<thead>
<tr>
<th>Solvent</th>
<th>Approx. solvent regain ml solvent/g dry gel</th>
<th>Approx. bed volume ml/g dry gel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethylformamide</td>
<td>2.2</td>
<td>4</td>
</tr>
<tr>
<td>Water</td>
<td>2.1</td>
<td>4</td>
</tr>
<tr>
<td>Methanol</td>
<td>1.9</td>
<td>3.5-4.0</td>
</tr>
<tr>
<td>Ethanol</td>
<td>1.8</td>
<td>3.0-3.5</td>
</tr>
<tr>
<td>Chloroform</td>
<td>1.8</td>
<td>3.0-3.5</td>
</tr>
<tr>
<td>n-Butanol</td>
<td>1.8</td>
<td>3</td>
</tr>
<tr>
<td>Dioxane</td>
<td>1.4</td>
<td>2.5-3.0</td>
</tr>
<tr>
<td>Tetrahydrofuran</td>
<td>1.4</td>
<td>2.5-3.0</td>
</tr>
<tr>
<td>Acetone</td>
<td>0.9</td>
<td>1.5</td>
</tr>
</tbody>
</table>

*Containing 1% ethanol. Particle size: 15-100 µm.

**EXAMPLE OF SPECIFIC APPLICATION**

Separation of glycerol esters in chloroform. Bed dimensions: 2.5x32 cm. Sample: 2 ml containing 4 mg of each substance. Flow rate: 0.6 ml/min.

**Weightlessness Can Be Confusing**

While much of the theory of the space age has no interest for the nonscientist, the concepts of orbiting in a gravitational field, and "floating freely" through space, are two which the public should be able to distinguish. The word "weightless" is used frequently to describe the condition of spacecraft and astronauts in orbit. A majority of readers of the daily press probably interpret weight to be simply the gravitational force of attraction between an object and the earth. I fear that many readers are led to the erroneous but understandable conclusion that if an object is weightless, then this force has ceased to exist. Some may invoke, as a reason, the great distance of an orbiting body from the earth. In fact, the height of most orbits reduces the gravitational force by only a minor part.
and the force is itself the cause of the orbiting motion, according to Newton's laws.

It is a pity that there should be scope for confusion over this basic principle of mechanics, as a scientific venture has rarely captured the interest of the public to the extent of the present space program (or spent as much public money). Furthermore, the interest will be greatly increased by the first Apollo mission, and there will then be a fundamental difference. The gravitational forces on an Apollo crewman will be very weak for much of his journey, and his weightless condition will indeed be due to his remoteness from the earth and moon.

Perhaps science writers, in view of the great public interest, should take care to make the distinction between the two different kinds of "weightlessness."

F. E. M. Lilley
Department of Geodesy and Geophysics. University of Cambridge, England

A Trained Eye on UFO's

Correspondence in your columns on UFO's points to a grievous lack of trained observers. For the elucidation of these rare and mysterious objects, first-class observations are necessary, and very few people, even among those supposed to be scientifically trained, can observe. The following drill, commonly used by observers of meteors, fireballs, and so on, is applicable and deserves to be better known. It is assumed you can transfer your whole attention to the phenomenon.

On becoming aware of the object, stand still and start counting seconds. Kick with your heel to mark your position exactly. Hold a hand out at arm's length and gauge the angular size of the object. (The thumb in width subtends 2½°, the open hand, 20°.) Note the brightness of the object, compared to other visible objects, and any changes that may occur. Establish the beginning and the end of the object's path with reference to marks on the horizon. Determine whether the object passes behind or in front of any landmark. Try to fix the position of touchdown on earth, if you think that has occurred. After the object has disappeared, make written notes of the above details. Transfer the seconds count to accurate time by your watch. Listen critically for sounds as-

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Associated with the object and time them. Proceed to the position of touchdown and search for material objects. Notice any smell, as of ozone, at this point. Feel for a temperature gradient. Pace off the heelmark from a permanent landmark for later transfer to a map reference. Obtain a watch correction to the nearest second, preferably from a radio time signal. Forward a fair copy of the notes to the nearest observatory.

Practice this for a few evenings on meteors, to get the hang of it. And next time Venus is a dayobject, go to a busy intersection with a companion and point it out to him. (Look! A flying saucer! See how fast it goes, past those clouds!) The reports in the press the next morning will be very entertaining.

F. P. Hughes

A Poverty of Spirit in Underdeveloped Nations

Parsegian made some valuable points concerning the factors that spur underdeveloped nations toward greater productivity and self-reliance (Letters, 21 Apr.). But he fails to consider the problems of a population debilitated by chronic diseases such as malaria, vitamin deficiency, intestinal parasites, semistarvation due to insufficient food, and, worst of all, by a poverty of the spirit, the result of living for generations at an animal level of existence.

One does not have to leave the limits of the United States to find areas where, a generation ago, the population suffered from malaria, vitamin deficiency, and all the other conditions that lead to debilitation. In various military training camps in the South during World War II, there was a constant alert for the presence of the anophelous mosquito, a malaria carrier. The state of Missouri closed its trachoma hospital about 1950, only because of the availability of antibiotics. The derogatory appellation of "redneck" usually describes one of the symptoms of pellagra, a vitamin deficiency disease.

Debilitation in parts of the South, in earlier years, led to the conclusion that the people were lazy, good-for-nothing, and that there was no need to help, for the money would be wasted. Many conditions have been

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corrected, but often the poverty of the spirit remains, induced by a continuous struggle to exist. American Indians living on their reservations exemplify this problem.

Foreign aid programs are not doles, inasmuch as a dole implies a welfare program in which the function is only to keep the recipient alive. The various aid programs allocate funds for specific projects which, in the long run, should help the people raise their standard of living. A good example of the benefits of aid programs was the recovery of Western Europe after World War II, more rapid than Eastern Europe which received the Soviet type of negative foreign aid. However, recipient nations which are underdeveloped cannot improve their living standard until they overcome their food and population problems.

Over-regulation, as Parsegian points out, has not assisted the situation. Often the governments have modeled themselves after ideological models which were proposed for nations in Western Europe a century ago to correct conditions then existent. In these instances, a flexible, pragmatic approach to government and regulation would be more helpful.

H. P. LEIGHLY, JR.
Department of Metallurgical Engineering, University of Missouri at Rolla, Rolla 65401

NSF Defends Individual Rights

The enclosed resolution on freedom of expression was passed unanimously on 6 March 1967 by the Los Angeles Division of the Academic Senate, University of California, and a copy sent to Leland J. Haworth of the National Science Foundation.

The University of California Academic Senate, Los Angeles Division, strongly commends the National Science Foundation for its recent reaffirmation of its policy which clearly sustains the right of an individual whose research is supported by the NSF to hold and express dissenting views, as any other citizen can, subject only to the restraints contained in the laws of the land. The adherence to this policy in the case of Professor Stephen Smale shows that the NSF defends this right indeed as well as words. The Academic Senate, Los Angeles Division, congratulates Director Leland J. Haworth on his forthright statements in this matter.

THOMAS L. JACOBS
Academic Senate, University of California, Los Angeles 90024

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time to the task of managing the flood of scientific information. This attitude is untenable. Every scientist must accept his share of the responsibility for controlling scientific information. He must realize, as a matter of course, that when he adds to the cascade of scientific information, he assumes a responsibility to participate in the management of the flood.

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EUGENE GARFIELD
Institute for Scientific Information, Philadelphia, Pennsylvania 19106

Aphids

Five projects for studying factors affecting the biological control of the arthropod pests of food crops have been proposed as part of the International Biological Programme. One of these projects concerns aphids. After consultation involving more than 100 aphidologists in all parts of the world, the project has been orientated around the green peach aphid, Myzus (Nectarinaphus) persicae Sulz., and other aphids associated with it on various crops. While the proposal is focused on this one species of worldwide importance, findings will also be relevant to the evaluation, selection, and implementation of biological methods to be used in biological and integrated control programs for crop aphids in general. Since the information required will be largely ecological, the project is being assisted by the publication of reviews of what is known of the biology

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and ecology of the aphids and their natural enemies.

A meeting to discuss methods and work plans for obtaining more information about biological aspects of aphid control was held in England at the Imperial College of Science and Technology (Field Station), 6–7 April 1967. The coordinator of the project, M. J. Way, brought together a small group of aphid workers from various parts of the world. They were helped by a representative group of British workers including experts in insect ecology. The meeting had no formal agenda but the discussion led to a clearer understanding of fields of work in which information was most needed. Such fields include: (i) Recognition and determination of the biological properties of aphid species and biotypes; (ii) relation of aphid and host plant; (iii) the determination of predatory species and of their role in the control of aphids; (iv) the evaluation of parasites and pathogens; (v) the role of aerial movement; (vi) the sampling techniques for aphids and associated species on plants; and (vii) population dynamics.

Within these fields useful reviews of methodology were made; the comparisons of the experience of several workers with the same method were particularly illuminating. Finally, ways in which the international nature of the project could be exploited were discussed.

Three approaches seemed open: (i) Complementary studies. Development of individual projects would result in much better coverage of the fields relevant to biological control. (ii) Comparative studies. Geographic separation of the study centers would provide opportunity to study, with standardized methods, the nature and effects of the genetic make-up of the population and the physical and biotic environment. (iii) Collaborative studies. A planned sequence of observations or experiments in different centers could provide principles with predictive value as, for example, studies in aerial movement in relation to future pest outbreaks.

It was decided that a set of methodology reviews by specialists in the different fields should be prepared and published in the I.B.P. Handbook series. It was agreed that although complementary studies could be initiated soon, some collaborative studies might need to wait until appropriate methodology had been selected and tested.

It was also agreed to circulate de-
Detailed proposals to aphid workers throughout the world and encourage their cooperation. Inquiries should be addressed to M. J. Way, Imperial College Field Station, Silwood Park, Sunninghill, Ascot, Berks, England.

M. J. WAY
Imperial College Field Station,
Silwood Park, Sunninghill, Ascot,
Berkshire, England

Calendar of Events

National Meetings
June
18-22. Society for Investigative Dermatology, Atlantic City, N.J. (G. W. Hambrick, Jr., The Society, Johns Hopkins Hospital, 601 N. Broadway, Baltimore, Md. 21205)
18-23. American Soc. of Ichthyologists and Herpetologists, annual mtg., San Francisco, Calif. (W. I. Follett, California Acad. of Sciences, Golden Gate Park, San Francisco 94118)
19-21. Heat Transfer and Fluid Mechanics Inst., La Jolla, Calif. (D. B. Olfe, Dept. of Aerospace and Mechanical Engineering Sciences, Univ. of California at San Diego, La Jolla, Calif.)
19-22. Western Soc. of Soil Science, annual mtg., Los Angeles, Calif. (J. L. Young, 100 Agricultural Hall, Oregon State Univ., Corvallis)
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Howerton, Director, Center for Technology and Administration Inst., 2000 G St., NW, Washington 20010)
21–23. Modern Titrimetry, 20th annual summer symp. on analytical chemistry, Claremont, Calif. (A. L. Beilby, Dept. of Chemistry, Pomona College, Claremont 91711)
22–23. Animal Reproduction, 8th symp., Urbana, Ill. (Short Courses and Conferences, 116 Illini Hall, Champaign, Ill. 61820)
22–24. American Soc. of Enologists, annual mtg., Santa Barbara, Calif. (The Society, Box 411, Davis, Calif.)
25–28. American Soc. of Agricultural Engineers, annual mtg., Saskatoon, Sask., Canada. (O. L. Symes, Dept. of Agricultural Engineering, Univ. of Saskatchewan, Saskatoon)
25–28. American Leather Chemists Asso., Lake Placid, N.Y. (W. T. Roddy, Executive Secretary, The Association, Univ. of Cincinnati, Cincinnati, Ohio 45221)
26–30. American Schools for the Deaf, conf. West Hartford, Conn. (E. W. Tilting, Arizona State School of the Deaf and Blind, P.O. Box 5545, Tucson 85703)
26–30. Computers in Chemistry, conf., Univ. of California, San Diego. (P. James, Chancellor Office, Univ. of California at San Diego, La Jolla)
26–8. Immunology, summer course, Lake Forest, Ill. (S. Dray, Univ. of Illinois at Medical Center, P.O. Box 6998, Chicago)
27–29. Western Soc. of Crop Science, University Park, N.M. (B. A. Melton, Jr., New Mexico State Univ., University Park 88001)
28–30. American Scientific Glassblowers Soc., 12th annual symp., Atlanta, Ga. (R. W. Poole, 100 Cedar Lane, Oak Ridge, Tenn. 37832)

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28-30. Society of Protozoologists, Toronto, Ont., Canada. (R. W. Hull, Dept. of Biological Sciences, Florida State Univ., Tallahassee 32306)

July
9-13. American Veterinary Medical Assoc., 104th annual mtg., Dallas, Tex. (Executive Secretary, 600 S. Michigan Ave., Chicago, Ill. 60605)
10-11. American College of Laboratory Animal Medicine, annual mtg., Dallas, Tex. (R. H. Yager, Secretary, ILAR-NRC, 2101 Constitution Ave., NW, Washington, D.C. 20418)
10-14. Nuclear and Space Radiation Effects, Columbus, Ohio. (IEEE, Technical Activities Board, 345 E. 47 St., New York 10017)
17-19. Sixth Aerospace Reliability and Maintainability Meeting, Cocoa Beach, Fla. (MEETINGS Manager, ASME, 345 E. 47 St., New York 10017)
24-29. Fluorine Chemistry, 4th intern. symp., Estes Park, Colo. (P. Tarrant, Dept. of Chemistry, Univ. of Florida, Gainesville 32601)

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27–29. Linguistic Soc. of America, annual summer mtg., Ann Arbor, Mich. (A. A. Hill, Box 8120, University Station, Austin, Tex. 78712.)


**International and Foreign Meetings**

**June**

22–25. Urology, 32nd Belgian Congr., Liège, Belgium. (L. Timmermans, Hospital de Bavière, Rue d’Urologique 66, boulevard de la Constitution, Liège)


26–30. Carbonium Ions, 1st intern. symp. on physical organic chemistry, Athens, Greece. (The Symposium, Dept. of Chemistry, Michigan State Univ., East Lansing 48823; or G. Gregoriou, Nuclear Research Center “Democritos,” Aghia Paraskevi, Athens, Greece)

**July**

2–4. Canadian Soc. of Clinical Chemists, annual mtg., Montreal, P.Q. (M. Francœur, Dept. of Biochemistry, Hotel-Dieu Hospital, 109 Pine Ave. W., Montreal)

2–6. Forest Products Research Society, annual mtg., Vancouver, B.C., Canada. (The Society, 417 N. Walnut St., Madison, Wis. 53705)


5–7. Canadian Federation of Biological Societies (Canadian Physiological Soc., Pharmacological Soc. of Canada, Canadian Assoc. of Anatomists, Canadian Biochemical Soc., Nutrition Soc. of Canada), 10th annual mtg., Montreal, Que. (Honorary Secretary, % Faculty of Medicine, University of Western Ontario, London, Ontario)

5–7. Congress of Medical Chemistry, 3rd intern. mtg., Paris, France. (Société de Chimie Thérapeutique, 2 rue d”Alesia, 75-Paris 14)


7–13. International Dental Federation, 55th annual mtg., and 14th congr., Paris, France. (Secretary General, 35 Devonshire Pl., London, W.1, England)


9–15. International Soc. of Urology, 14th congr., Munich, Germany. (Secretary General, 63 Ave. Nile, Paris 7, France)


11–14. International Union of School and University Health Medicine, 5th congr., Prague, Czechoslovakia. (The Union, Centre International de l’Enfance, Château de Longchamp, Bois de Boulogne, Paris 16, France)


16–22. Organic Photochemistry, intern. symp., (IUPAC), Enschede, Netherlands. (W. G. Dauben, % Dept. of Chemistry, Univ. of California, Berkeley 94720)


19–22. Ibero-Latin American Congr. of Dermatology, Barcelona, Spain. (J. Pinolaguado, % Facultad de Medicina, Univ. de Barcelona, Spain)


23–28. International Soc. for Neurochemistry, 1st intern. mtg., Strasbourg, France. (J. Folch-Pi, McLean Hospital, Belmont, Mass.)


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