RECENT PROGRESS IN MICROBIOLOGY

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SYMPOSIA HELD AT THE VII INTERNATIONAL CONGRESS FOR MICROBIOLOGY STOCKHOLM 1958

Under the auspices of
the International Association of Microbiological Societies
IAMS
and the Swedish Microbiological Society

With an ADDENDUM (in English and French) on
THE STRUCTURE AND FUNCTION of IAMS
Compiled by C.-G. HEDÉN, Secr. Gen.

Editor: G. TUNEVALL

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PREFACE

Recent Progress in Microbiology, the title chosen for this volume containing the six symposia held at the VIIth International Congress for Microbiology in Stockholm, August 1958, has proved to be remarkably appropriate. As the President of the Congress stressed in his inaugural address, the topics of these symposia had to be decided two years in advance, and subsequently proved to have been chosen with a foresight almost too great. Actually, most of the topics selected were made the subjects of other symposia arranged in the meantime in several places. However, in these fields which are obviously the foci of a universal interest and the subjects of a most intense research activity all over the world, this fact does not seem to have restricted the number of new discoveries reported or new ideas presented, but to have assured the freshness of the submitted material. In addition, the policy adopted by the organizing committee to use a substantial part of the Congress funds for securing the contributions of the most outstanding representatives of the different fields gave the symposia the character of a truly world-wide enterprise.

This publication differs in one noteworthy respect from most other symposia books. The collection in one volume of six symposia covering fields seemingly remote from each other may, perhaps, seem of questionable value to the specialist. But this has appeared to us entirely in accordance with the very aim of all congresses: to furnish mutual insight and contact between different lines in present research. Although the different fields represented here may at first appear unrelated they have very essential principles in common. After all, the aim of all efforts along these different lines is the same: to approach the very principle of organic life and activity. The tools used in these efforts are to a great extent shared by all specialized branches, as are the principles for a biologically sound evaluation of the results obtained. Therefore, on first reading, the symposia will simply provide the most recent information from a number of different areas of research. But on re-reading they will, I hope, appear more as a general survey of modern microbiological science. The innumerable connections and interlinks between the different fields will stand out clearly and the reader will have the opportunity to give the right answers to many questions raised in the discussions, perhaps better than could the discussants themselves, a thrilling experience for all of us modestly working in natural science.

In their addresses to the members of the Congress at the Banquet held on the 7th of August in the City Hall of Stockholm, the President of the Congress, Sven Gard, and the President of the International Association of Microbiological Societies (IAMS), Stuart Mudd, touched upon some very salient points concerning the responsibilitites of Science and scientists to Mankind. The thoughts expressed by these speakers are considered worthy of being saved from oblivion. It would be of the utmost importance if these thoughts could inspire a world-wide cooperation between microbiologists, with the view to preventing deleterious misuse of microbiological research.

Finally, the transactions of the IAMS Assembly held at Uppsala on August 6th are published as an appendix.

Gösta Tunevall

PRESIDENTIAL ADDRESSES

to the members of the VIIth International Congress for Microbiology
delivered at the Banquet held in the City Hall of Stockholm
7th August 1958.

President of the Congress,
Professor SVEN GARD:

After four days of serious work this is the time to relax and to rejoice. It is, therefore, with great hesitation that I am now taking the risk of striking a discordant note by an address on a serious subject of, as I see it, great urgency.

Much has been said about the universality of science, about its capacity to break national and racial barriers, to form bonds across borders. No doubt such qualities are inherent in science, but it is up to the scientists to cultivate and develop them. Have they succeeded in doing so? Have they made the world a happier place to live in?

I am afraid that few people are ready to answer that question with an unqualified yes. The world today is acutely conscious of the power of science, for good, and—alas—for evil. It would be idle to deny that scientists have built more and stronger barriers than they ever demolished.

So far microbiology has contributed little to the present political tension. Apparently it has not easily lent itself to evil purposes. Will it remain a politically indifferent science? I am afraid that it will not. There are danger signals ahead, plainly visible to everybody.

We have heard these days and will hear more about feats that a few years ago were possible only in science fiction. A new dimension has been added to microbiology. Scientists are today able to impress new characters on living beings, to transform if not form living matter, to create at will new species. The perspectives opened up by these discoveries are wide indeed. We all know what happened when man began to tamper with the nucleus of the atom. Is there reason to believe that tampering with the nucleus of the cell will have less far-reaching consequences? The brave new world may not be far away.

I believe that the situation is not serious as long as everything is done openly. The moment science goes underground, research becomes a secret service branch, is the time for real misgivings. Then a vicious circle is about to close. Then it may be too late for remedial action.

There is probably no scientific achievement that could not be used for dual purposes. That is the way the world is constructed. It is no fault

of science and it should not detain us from trying our best to make progress. The problem is how to safeguard against abuse.

This could be accomplished, if scientists the world over were determined to make science stay above ground; if they all refused to take any part in things done under the cover of secrecy. What we need is a scientific world conscience, an international brotherhood of scientists. This may sound ridiculously unrealistic and naïve; and yet, was it not being too realistic, too sophisticated that precipitated the present crisis? Should we not learn from experience? Should we not try to reform?

Well—I know as well as anybody that all such ideas are sheer Utopia. International organization and international control, even if inadequate, seem to be the only means by which anything at all can be accomplished.

At present no international control system exists, but at least we have an international organization. Therefore, I appeal to IAMS. I do not ask that it transform into an international brotherhood. I will only ask that it recognize the existence of the problem. If this is done, some action will have to be taken. It might be said that the present issue is not of a scientific nature and, therefore, no business of a scientific organization. I disagree. The question before us concerns the scientists first, last, and always. If they fail to find an answer, nobody else can do it. In my opinion, IAMS could find here a mission, more important than nomenclature. It would be in a position to be able to watch the development and sound the alarm, if need arises.

I shall not try to pursue these thoughts any further. But I would like to propose a toast in which I hope you can all join. It is a toast to microbiology—may its immense possibilities be developed for the benefit of mankind. It is a toast to our International Association—may it prosper; may it always be alert to the vital problems that concern our science.

President of IAMS,
Professor STUART MUDD:

Mr. Minister, Professor Gard, Ladies and Gentlemen,

I hope that every one of us will take Professor Gard's words profoundly to heart. As an officer of IAMS, I pledge myself to do so.

I should like to express appreciation and heartfelt thanks on behalf of IAMS to all those who have undertaken with such devotion and skill the great task of organizing and conducting this Congress: we would thank Professor Sven Gard and Dr Carl-Göran Hedén, the Swedish Organizing Committee, the Executive Committee, the Editorial Board, the Ladies'

Committee, the Congress Bureau, the Sections Board, the Supporters and in particular the Swedish Government and the City of Stockholm. No one who has not been through the organization of a Congress, I think, can appreciate the magnitude of the task which our Swedish colleagues have performed with such skill and with such modesty. It has been particularly fortunate to have the Congress in the beautiful city of Stockholm where there are so many pleasant attractions—and may I add—so many beautiful distractions.

As Professor Sven Gard and Sir MacFarlane Burnet said at the opening session, this Congress has been greatly an experiment in its organization. Participation and subjects to be discussed have been purposely limited. If I may venture to interpret the results of an experiment which is still in progress, I conclude that the experiment is being notably successful. I think that the *number of participants* in future Congresses can safely be left to the decision of the national organizing group, who will be most familiar with circumstances in the particular locale of the Congress. I do hope, however, that some limitation of *subjects to be discussed*, with the resultant sharp focussing of the programs both of Symposia and of contributed papers, which has been so noteworthy a feature of this Congress, will be maintained in future Congresses.

I am particularly happy to be told that our Canadian colleagues have already begun the organization of the Eighth Congress, scheduled for August 19 to August 26, 1962, in Montreal. This early start augurs well for the success of the Eighth Congress.

May I appeal to the delegates of the national societies to give early thought to the Ninth Congress in 1966. The Congresses must be planned for long in advance, and it would be a great advantage to have an invitation or invitations in hand for the Ninth Congress, somewhere in Western Europe, possibly in the USSR.

It is well, I think, for us as *microbiologists* to realize that we are in fact micro-*biologists*. We explore that segment of biology which may be designated in the words of Blaise Pascal: "L'infinité en petitesse", using all relevant instrumentalities of biology, chemistry and physics. In microbiology from the first, the fundamental and theoretical and the immediately utilitarian and practical have developed side by side. The long controversy over spontaneous generation, culminating in the brilliant experiments of Louis Pasteur and of Tyndall, contributed fundamental insights into the nature and continuity of life, as well as affording a basis for microbiological technology. Pasteur's studies of fermentation contributed to the foundations of modern enzyme chemistry. Robert Koch, Lord Lister, Schimmelbusch, Theobald Smith and a host of others laid technological foundations from which our modern comparative freedom from infective

diseases has then developed. The ecological studies of Winogradsky and Beijerinck yielded insights into aspects of the chemistry of life processes. Our great and beloved colleague, Professor Albert Jan Kluyver, whose absence we note with profound regret, introduced and abundantly documented the fruitful conception of the essential unity of biochemical processes, a concept whose enormous integrating value is only now coming to be fully realized in practice.

It is gratifying also to note the integrative value of these Congresses of Microbiology, through the acquaintances and friendships they foster. Science is preeminently the area in which universal communication can be achieved. One notes with pleasure the very wide representation of peoples present here. Membership in IAMS now includes the national societies of thirty-one countries. In particular I should like to express my personal pleasure in the active participation of colleagues from Eastern Europe and the USSR. Understanding between scientists and other citizens of many countries, though not a *sufficient* condition, is surely a *necessary* condition, for that peace on earth and good will among men which is so profoundly to be desired and sought for.

SYMPOSIUM I

Recombination mechanisms in bacteria

Moderator: LEDERBERG, J.

Organizer: KLEIN, G.

Lecturers and Titles:

JACOB, F. and WOLLMAN, E. L.
The relationship between the prophage and the bacterial chromosome in lysogenic bacteria

STOCKER, B. A. D.
Phage-mediated transduction

CAVALLI-SFORZA, L. L.
Recombination in bacteria

EPHRUSSI-TAYLOR, H.
The mechanism of desoxyribonucleic acid-induced transformations

Members of the Panel: AUSTRIAN, R., BERTANI, G., BRAUN, W., FREDERICQ, P., SZYBALSKI, W.

Discussant: SCHAEFFER, P.