Essential Fatty Acids

Edited by

H. M. SINCLAIR

FOURTH INTERNATIONAL CONFERENCE ON
BIOCHEMICAL PROBLEMS OF LIPIDS

Oxford 15–18 *July* 1957

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PROLOGUE

[On the afternoon of Tuesday 16 July the Conference adjourned to Stratford-on-Avon to see a performance of William Shakespeare's *Julius Caesar*]

ACT III SCENE 2

Enter Mark Antony contemplating Caesar's atheromatous aorta

ANTONY: If you have plaques, prepare to shed them now.
You all do know this corn-oil: I remember
The first time Larry Kinsell gave a dose;
'Twas on a summer's evening, in his ward;
That day we overcame the Keysii.
Look, in this place ran chylomicrons through;
See what a plaque cholesterol esters made,
Esterified with saturated fat.
This plaque the well-belovéd butter caused
Through Hilditch's cis-trans milk isomers,
For Hilditch, just like Klenk here, studies lipids—
Judge, O you gods, how dearly these two love them—
This was the most unkindest plaque of all,
For when the butter lipids get laid down
Corónary clots, more strong than traitors' arms,
Quite vanquish us. Then burst our mighty hearts.

But if we take a tot or two of corn-oil—
E'en in the face of Mead's silicic columns,
Or alkali isomerisation,
Or counter-current distribution,
Reversed-phase chromatography as well
As James's gas-phase—watch the plaques dissolve.
Oh what a find is here for middle-aged men!
Then I and you and all of us drink down
Polyethenoid acids with our meals—
Essential fatty acids sometimes called—
While lipoproteins sludge along our veins.
If not, you ail; and I perceive you need
A pint of corn-oil full of double bonds:
This great elixir with B_6 as well
Dissolves our clots and makes our plaques dispel.

H. S.

EDITORIAL NOTE

THE International Conferences on Biochemical Problems of Lipids were initiated by Professor R. Ruyssen of Ghent. The first conference was held in Brussels in June 1953 under the auspices of the Royal Flemish Academy of Belgium; its proceedings have been published by this Academy (*International Conference on Biological Problems of Lipids*, Koninklijke Vlaamse Academie voor Wetenschappen, Letteren en Schone Kunsten van België, 1953).

The second conference, which was attended by more than 250 scientists from 20 nations, was held in Ghent in July 1955 with the collaboration of the Vlaamse Chemische Vereniging of Belgium. Its proceedings were subsequently published in London (*Biochemical Problems of Lipids*, edited by G. Popják and E. le Breton, London: Butterworths Scientific Publications, 1956). At this conference members voted that the conferences should be perpetuated, should be small and should be entrusted to Professor Ruyssen for organising. National Representatives were elected to sponsor the nomination of permanent members of the conferences; in addition, temporary members could be invited for a particular conference the subject of which was of particular concern to them.

The third conference was the first to discuss a particular subject. It was held in Brussels in July 1956 under the presidency of Professor Ruyssen, and was attended by 138 scientists. Its proceedings have been published by the Koninklijke Vlaamse Academie voor Wetenschappen, Letteren en Schone Kunsten van België (*The Blood Lipids and the Clearing Factor*, Brussels: Palais der Academiën, Hertogelijke Straat, 1). At this conference the members decided that one should be held the following year to discuss Essential Fatty Acids and that it should be held in Oxford.

The fourth conference accordingly took place in Oxford, the 106 members staying in Magdalen and St Hugh's Colleges. To the great regret of all participants, Professor Ruyssen was unable to attend through sudden duties in Africa. The conference consisted of contributions by participants, mainly by invitation, followed by a discussion. The last morning was devoted to impromptu summaries by certain of the chairmen of the sessions; these were recorded and are reproduced with very little alteration. The subject of this conference is one that is rapidly advancing and every attempt has in consequence been made to publish its proceedings as quickly as possible. Some papers have been slightly shortened but most are included with only editorial corrections. The International Conferences are once more indebted to Messrs Butterworths for undertaking the publication, and as editor I desire to thank them for their courteous efficiency. I thank also Mr A. L. Macmillan for acting as editorial assistant and Miss Susan Strellett for secretarial assistance.

The greatest value of small conferences of this type is the informal discussion that occurs outside the main meetings, and I believe Oxford afforded pleasant surroundings for this. It is, however, hoped that these proceedings provide a useful summary of the present position of an important subject.

H. M. S.

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WELCOMING ADDRESS

by E. R. H. JONES, FRS

Waynflete Professor of Chemistry in the University of Oxford

MY MAIN and very pleasant duty is to convey to you all, on behalf of my colleagues and myself, a very warm welcome to Oxford.

Two essential factors in ensuring the success of any conference are that the subject should be both important and timely. These are certainly true today. The relationship between heart and other diseases and fatty acids in the diet is now a very lively issue and one of paramount importance to mankind. Burning question though this is, it is not one to which you would expect me to contribute at this stage. I would rather look at the picture for a few moments from the point of view of the state of our knowledge of the fatty acids themselves.

These have been known and carefully studied from the earliest days of our subject, but our knowledge and understanding of their structures and synthesis has increased enormously in recent years. As in so many fields these advances have been the result of striking and almost miraculous developments in techniques. Chromatography, in all its several forms, has played a major part in facilitating the separation, recognition and estimation of fatty acids—I am sure this will be very evident in many of the papers to be read here—this is particularly so as the result of the work of Dr James and his colleagues who have pioneered the most recent and perhaps the most remarkable development, that of gas–liquid chromatography. It is only a few years ago that we had to think in terms of grammes of material, now we are in the milligramme era and verging on that of the microgramme.

Then we have the contributions made in the field of unsaturated acids by the extension of our range of vision into the ultra-violet and infra-red regions. The electronic transitions now detectable in the ultra-violet have given us new tools for working with the conjugated and potentially conjugated acids. Our ability to detect molecular vibrations of many kinds from infra-red absorption spectra is assisting very materially with the difficult stereochemical problems. To me there is little doubt that stereochemistry in the classical sense and in its more recent trend into the understanding of the preferred *conformations* of molecules will be found to be of great significance in connection with biological processes.

The availability of these new techniques is constantly leading to the isolation and description of new acids, compounds present in only small amounts or possessing hitherto unheard of structural features. In this connection one thinks of the remarkable sterculic acid and of the acetylenic compounds which are gradually coming to light.

Organic chemists have lately interested themselves in the synthesis of unsaturated acids and since 1950 oleic, linoleic, ricinoleic, linolenic and several other acids have been synthesized. These syntheses were of course unimportant from the structural point of view, the structures already being established beyond all possible doubt, but they signalled the availability of

new and powerful synthetic methods and the acquisition of an ever-increasing control over the stereochemical course of organic reactions. These syntheses have also provided reference substances for spectral studies and the way is clear for making available almost any kind of labelled acid that might be required for biochemical studies. Although the synthesis of arachidonic acid has not yet been published, there is no doubt that it could be made in the correct stereochemical form or in any variant of it that might be required.

The steroids, which for so long have provided the organic chemists with delectable problems, are closely implicated in your present deliberations. During the last few years we have been fascinated and stimulated by the emergence of ideas on the biogenesis of steroids; ideas which have been skilfully confirmed by Bloch and Dauben in the U.S. and by Cornforth and Popják in this country. We are a long way from knowing the whole of the story but somewhat greater realism is now possible in any discussions involving cholesterol and the important substances derived from it.

I cannot but envy the size of your conference—it cannot be far from the optimum—this, and the ample time made available for discussion should go a long way to ensuring a very profitable meeting. Not only have you got the right *number* of people here but you seem to have got the *right people* also: scientists from a dozen different countries, more from overseas than from home—people who are acknowledged experts in the many fields related to the main subject. We are proud and happy that you have honoured us by coming to Oxford. I hope most sincerely that the choice of Oxford for this meeting will prove to have been a happy one and that you will find the climate and atmosphere here congenial and scientifically invigorating.

The ingredients are here—of the right quality and in the correct proportions—it only remains to allow them to interact while keeping a watchful eye on the reaction conditions. And who better to begin the process than this country's most distinguished contributor to the subject of fats and oils, Professor T. P. Hilditch. We are all delighted that, although retired, his health is still good and his interests as lively as ever.

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