



Prof. dr. J.F. Arens 1914-2001



Prof. dr. J.F.G. Vliegenthart

In 1969, I was asked by Professor Arens and one of his co-workers, Assistant Professor Vliegenthart, of the Bio-Organic Chemistry Group at Utrecht University to work on a PhD project focused on the structural analysis of oligosaccharides and glycoconjugates using EI-MS. Both were familiar with the sequencing of small peptides using EI-MS, but had no knowledge in the carbohydrate field.

So, before starting, I had to teach myself carbohydrate chemistry without any helpdesk.

The Early Days.

Description

From PhD to Post-Doctoral Stays



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Prof. dr. J.F.G. Vlieg

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Wp

Carbohydrate Research
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Seihers

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MASSENSPEKTROMETRISCHE UNTERSUCHUNGEN

XIX. MITTEILUNG*. KOMBINATION VON GASCHROMATOGRAPHIE UND MASSENSPEKTROMETRIE ZUR ANALYSE PARTIELL METHYLIERTER ZUCKERDERIVATE. DIE MASSENSPEKTREN VON PARTIELL METHYLIERTEN METHYLGLUCOSIDEN

K. HEYNS, K. R. SPERLING UND H. F. GRÜTZMACHER

452

As a start, Hans Vliegthart gave me two papers of the group of Professor Heyns of the University of Hamburg

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MASSENSPEKTROMETRISCHE UNTERSUCHUNGEN

XVII. MITTEILUNG*. DIE MASSENSPEKTROMETRISCHE BESTIMMUNG DER VERKNÜPFUNGSTELLEN AMINOZUCKERHALTIGER POLYSACCHARIDE. MASSENSPEKTREN VON DERIVATEN DER 2-AMINO-2-DESOXY-D-GALAKTOSE

K. HEYNS, G. KIESSLING UND D. MÜLLER

Institut für Organische Chemie der Universität Hamburg (Deutschland)

(Eingegangen den 1. Dezember, 1966; modifiziert den 13. Februar, 1967)

A free instruction: "Explore the possibilities of EI-MS for carbohydrate analysis".

Reading more literature about carbohydrate analysis showed me the value of NMR spectroscopy.

I proposed my supervisors to include also NMR in my PhD project and they agreed.

The available MS and NMR instruments at Utrecht University in the early 1990s were:



Varian
XL-100 NMR



AEI MS-500



STRUCTURE DETERMINATION OF OLIGOSACCHARIDES

AN INVESTIGATION OF PERTRIMETHYLSILYL DERIVATIVES
BY MASS SPECTROMETRY AND PMR SPECTROSCOPY



HANS KAMERLING

Electron impact mass spectra of pertrimethylsilylated disaccharides with different linkage types.

100-MHz ^1H NMR spectroscopy of pertrimethylsilylated disaccharides with different linkage types.



12 June 1972

Glycochemistry
Glycobiology
Glycomedicine
Glycophysics
Glyco(bio)technology

Analysis:

Paper chromatography
Colorimetry
Polarimeter (optical rotation)
GLC with packed columns
Electron-impact MS of small volatile molecules
60/100 MHz ^1H -NMR of small molecules (1D); ^{13}C NMR
A few chemical degradation protocols

Synthesis:

Organic synthesis of mono- and disaccharides

2014



1969

Analysis:

Capillary GLC, electrophoresis
EI-MS, FAB-MS, MALDI-MS
up to large biomolecules
Up to 900 MHz ^1H -NMR of large biomolecules (1D and 2D);
X-ray
Exo- and endoglycosidases
Many different tags
Microarrays
Several chemical degradation protocols

Synthesis:

Organic and enzymatic synthesis of relatively large glycans
Synthesizer
Multivalent conjugations

Interaction studies:

NMR, MS, SPR, MC, TEM, AFM, MD

Molecular modeling



I did not leave the group in 1972 and got a temporary position as Assistant Professor at Utrecht University. A contract that was prolonged a couple of times, until I got a permanent position (Associate Professor) in 1978.

At the end of the seventies Hans Vliegenthart got permission from Professor Arens to start his own research group on carbohydrates and glycoconjugates. And I stayed with him.

But I did not know that this should become a stay together until his retirement in 2001.

To explore fundamental questions in “structural functional glycomics” via a multidisciplinary carbohydrate-based program, built up from three domains

structural **analysis** of
polysaccharides and
glycoconjugates

1969-2014

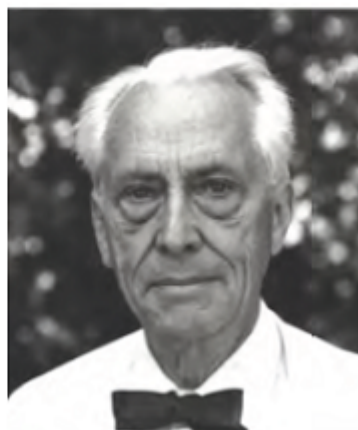
chemical / enzymatic
synthesis of oligosaccharides
and glycoconjugates

1973-2009

carbohydrate-protein and
carbohydrate-carbohydrate
interactions

1994-2009

Prof. dr. Bengt Lindberg
1919-2008



Prof. dr. Akira Kobata



Learning abroad (2x three months)

The kitchen secrets "anno 1974" of the structural analysis of bacterial polysaccharides I learned in the Lindberg group at the University of Stockholm.

The kitchen secrets "anno 1981" of the preparation, the separation and the structural analysis of glycoprotein-derived glycans I learned in the Kobata group at the University of Kobe.

Category

1. News