



A. van der Gen

Vitamins in wartime

In the summer of 1941, Coco Arens and Davy van Dorp (both 26 years old and recently awarded doctorates in Amsterdam) entered the employ of Organon in Oss. In 1939, the company began to market the Davitamon 5 vitamin preparation. The product became highly popular, especially when the food situation deteriorated during the German occupation. Davitamon 5 contains vitamins A and C, substances that became increasingly scarce as the war continued. It seemed obvious, therefore, to look for a synthesis. In January 1943, the occupying forces incorporated Organon in Schering A.G., a major pharmaceutical company based in Berlin. Schering sent Dr H.H. Inhoffen (who was later to become a professor at Braunschweig University) to Oss to lead the research efforts. The first assignment Inhoffen — a highly motivated scientist and not a fanatical Nazi — gave to the young Dutch scientists was “synthesize vitamin A and similar substances.” Each time Inhoffen was recalled to Berlin for a meeting, he returned with suitcases full of valuable chemicals and glassware of a quality that could not be had in the Netherlands.

Nature

Arens and Van Dorp succeeded in their efforts and, late in 1945, they sent a manuscript to the prestigious scientific journal *Nature* in which they described the synthesis of vitamin A acid. This publication came as a real bombshell, since prominent research groups around the world had been working on the synthesis of the equivalent alcohol, vitamin A, for many years. Nobody could have imagined that it would be possible for scientists in the occupied Netherlands to create such a difficult molecule. With vitamin A acid available, the synthesis of vitamin A itself seemed a piece of cake. From acid to alcohol: some reduction will suffice. However, it was not that easy, since vitamin A acid is too sensitive and will disintegrate quickly. But the two Dutchmen were not to be dismayed. They came up with a new reaction, with which they produced vitamin A aldehyde. On 9 August 1947, *Nature* published a short article announcing the reduction of aldehyde to alcohol under mild conditions. The synthesis of vitamin A had been achieved!



Isomers

The preparation created by Arens and Van Dorp is non-crystalline and only contains 35% vitamin. The rest are stereoisomers, substances with the same molecular composition but a different three-dimensional structure. This is caused by the fact that vitamin A has a side chain with 4 double bindings. Each double binding may have two forms, cis and trans. In principle, therefore, sixteen isomers are possible, while only one is the correct one.

[See next page >>](#)

Vitamin A

Vitamin A was discovered as early as 1909 as a fat-soluble substance that is indispensable to life. In 1913, the substance was isolated and given the name of “fat-soluble factor A.” It was later discovered that the same substance occurs in the eye protein rhodopsin and is therefore crucial to eyesight. A lack of vitamin A causes night blindness. It also plays a vital role in the development of the skin. The structure was presented in 1931. It is actually not a real vitamin, because it is formed in the human body from betacarotene, which is therefore sometimes referred to as “previtamin A”. Betacarotene is a common substance in nature (it is found in carrots, tangerines, and green vegetables), which means that a vitamin A deficit will not occur in people who enjoy a varied diet. The daily allowance for vitamin A (a.k.a. retinol) recommended by the Dutch Nutrition Council is 2700-3300 IU (international units), the equivalent of 0.8-1 milligram.

>> Vitamin A

The Chemisch Weekblad of 23 Augustus 1947 wrote: "A synthesis has now been developed for all known vitamins. Only vitamin A, whose structure was first known, had until now stubbornly resisted any attempts at synthesis. With fully justified national pride, we can now report that this final step in contemporary vitamin research has been taken by our compatriots Dr J.F. Arens and Dr D.A. van Dorp."

Several months later, researchers of Hoffmann-La Roche published an article in Helvetica Chimica Acta in which they described their synthesis, which does lead to pure, crystalline, vitamin A. This method appeared extremely well suited for upscaling, and Roche soon became the major producer of vitamin A. Organon never decided to manufacture vitamin A. The synthesis developed by Arens and Van Dorp includes several steps that are difficult to

carry out on a large scale. This would have required investments of several millions, and this kind of money was not available in the post-war Netherlands.

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Dr J.F. Arens and Dr D.A. van Dorp in 1948

The storming of Bourtange

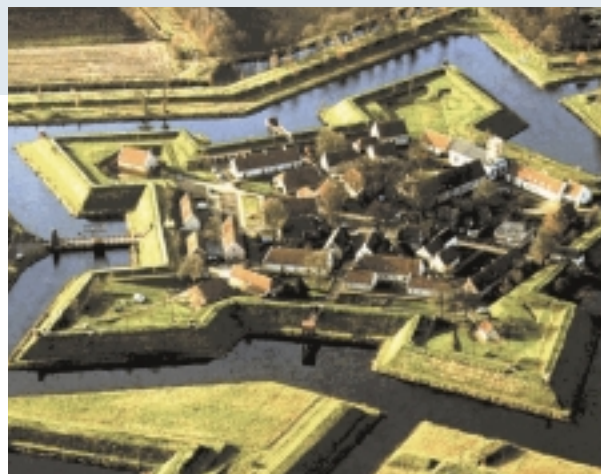
You will probably remember the trip to Bourtange on Sunday 7 July for a long time, not only because this centuries-old fortress looks as if it is still functional today but also because the past will turn out to be very alive in the present.

Bourtange is a beautiful little town near the German border. For centuries, it was used as a fortress. It is a typically Dutch fortress. The defensive capabilities of the water and the many swamps in the area were used to maximum advantage. Several star-shaped moats and walls surround Bourtange. The fortress saw active service from 1577 to 1851 and was part of a string of fortresses — Oudeschans ('schans' meaning fortress), Boonerschans, Nieuweschans — defending the vital city of Groningen against all attackers.

After 1851, the fortress lost its strategic value and the moats were filled in. The once impressive fortress turned into a peasant village. But not for all times! In the 1960s, a restoration of the fortress to its original state of 1742 was energetically undertaken. The builders were fortunate because they could use the original drawings. Some ten years ago, this drastic make-over was completed.

Murder

As you will soon discover, the past is still alive in Bourtange. Do not be alarmed when you suddenly encounter some soldiers dressed in what must be very ancient battle dress. And what happens next ... will be explained on the spot. The students will be divided into teams. Each team has to find out as much as it can about the history



Bourtange

of Bourtange. Meanwhile, the teams should also solve a gruesome murder that occurred in the town some 400 years ago. Perhaps the strange characters lurking around in the fortress know more about this mysterious affair. Who knows, you might succeed in extracting some information from them. The team that plays the game most skillfully wins. Good luck!



Tomorrows program

Sunday 07 July 2002

MENTORS / SCIENTIFIC OBSERVERS

08:00 Translation Practical Examination
13:00 Lunch at hotel
14.00-17.00 Excursion Eernewoude (optional)
19:00 Dinner at hotel

STUDENTS

11:00 Instruction in Safety practices (in 2 rounds of 4 groups)
12:00 Lunch at hotel
13.30-17.00 Excursion Bourtange
19:00 Dinner at hotel

GUESTS

13:00 Lunch at hotel
14.00-17.00 Excursion Eernewoude
19:00 Dinner at hotel

Registration of the delegations



All delegations will be received and registered at the Academieggebouw. At times, things get a little hectic, but many hands make light work.



The flag of the Chemistry Olympiad is raised near the Academieggebouw.



Upon their arrival, the students and mentors are taken under the wing of their hosts. The Byelorussian delegation has already passed registration and has found its host.



Afterwards, there is still time for a nice lunch to recover from the journey.



Around 4 o'clock, students who have just received the latest Catalyzer (no. 4) occupy the steps of the Academieggebouw. If you have any interesting information, gossip, or other newsworthy item, please pass it on to one of the Catalyzer editors.

In the limelight: The Chinese team



The Chinese team: Liu, Lu, Wang, and Zhu

The Chinese team arrived yesterday and has regained most of its composure, despite the time difference. They explain that jet lag is not so bad when you are traveling with the sun.

Their first impression of the Netherlands is positive: it is very clean here, and they are relieved that they have exchanged the clammy heat of China for more comfortable weather. That this comes with an occasional light shower does not bother them; on the contrary, they feel it is part of the ultimate Netherlands experience.

The members of this team go in for many hobbies: they are not only musically inclined, but they enjoy reading (History and Science), basketball, soccer (with the Netherlands and Brazil as their favorite teams), computer games, and swimming. Of course, the latter they can do in Zuidbroek at any time...

Welcoming reception and dinner



All guests are welcomed by Jan Apotheker, the chair of the organizing committee. He hopes everyone will have a good time in Groningen and success in the Olympiad. That calls for a toast, of course.



The first time most of the guests get a taste of food in the Netherlands. Shrimps, mackerel, herring, and potato salad. But also rice and meat, of course, for those who do not want to start off too exotically.

International Chemistry Olympiad gathering steam

The International Chemistry Olympiad is coming along nicely. Not only are the participants pouring in — it is now Friday afternoon — but the delegates of nearly all observing countries have also arrived. The worldwide appeal of the Olympiad is evident from the number of countries that have sent observers. This year, no less than eight countries are present in Groningen because they are considering to send participants to the International Chemistry Olympiad next year. The Arab Bureau of Education for the Gulf States does the honors for several countries simultaneously, among them the United Arab Emirates and Saudi Arabia.

The other observing countries are:

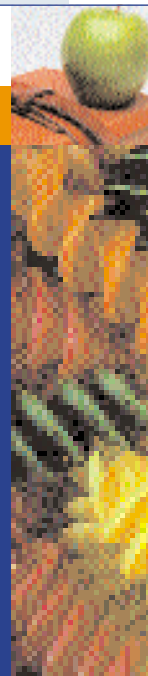
- Cote d'Ivoire
- Peru
- Japan
- Portugal
- Mongolia
- Tadzhikistan
- Nigeria

What's on today's menu?

Saturday 06 July 2002

Dinner Buffet at It Wiid

- Portuguese fish soup
- Crispy salad with French dressing
- Ham and pumpkin with a honey dressing
- Various types of breads with butter
- Lamb curry with risotto
- Couscous with mixed vegetables
- Spätzle with cream and mushrooms
- Chicken saté with dried onions and pickled cabbage Indonesian style
- Potatoes au gratin
- Steamed fillet of hake with lemon grass and a white wine sauce
- Tortellini with fresh tomato sauce
- Chocolate blancmange with blueberry sauce and cream



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34th International
CHEMISTRY OLYMPIAD

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