How Basel changed the world

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Christoph Merian Verlag

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Introduction

“Is it possible for the flap of a butterfly’s wing in Brazil to set off a tornado in Texas?” The mathematician, meteorologist and co-inventor of Chaos Theory, Edward N. Lorenz, raised this issue in 1972. In our little chronicle, *How Basel changed the world*, we intend to pursue this butterfly effect, albeit from a rather local perspective: the centre of the world in this book is Basel. Here too, world-shaking events have taken place and the effects of experiences and discoveries here have ultimately been felt across the globe – irrespective of their apparent irrelevance at the time or their subordinate importance, as well as the role originally played by chance.

The German news magazine *Der Spiegel* called the city of Basel a “global city in pocket-book format”. But is Basel really a city of world importance? Although global players of world renown have been active here, and indeed still are – one only has to think of Erasmus of Rotterdam, Friedrich Nietzsche, Herzog & de Meuron and the Basel “Chemische” (chemical industries) – Basel is more a provincial town than a metropolis. What is more, in the original sense of the term “provincial” it is an independent part of a larger whole. If small events can unpredictably alter a system in the long-term, then world history can also be changed from Basel. There would be a correspondence between the butterfly in Brazil and the black-headed gull in the air above the so-called knee of the river Rhine …

This book tracks down such impacts by viewing the world from Basel and asking: What happened here that had global consequences? What ideas and products from Basel have influenced the course of world history?

How Basel changed the world is a book about local history, written out of love of country, and very much in the spirit of the great Swiss author Gerhard Meier: “I believe that you only become a world citizen through being a provincial. You have to go through the official channels: from provincial to global citizen.” *How Basel changed the world* may involve a

touch of navel gazing, but it does so without self-aggrandizement. It is based on a different prototype, namely, the St. Mary Mead Principle. This fictional English town is in a position to present remarkable crime statistics: over a space of about forty years, sixteen murders were committed there. In the words of Miss Marple: “Terrible things happen in a place like this, I tell you. You have the opportunity to observe things here like you never have in a city.” Agatha Christie’s Miss Marple, a somewhat singular older lady, solves her cases with the help of a simple but extremely effective principle: she questions odd everyday things, finding in them the key to the crimes. “Who cut holes in Mrs Jones’s net shopping bag? Why did Mrs Sims only wear her new fur coat once?” *How Basel changed the world* does not engage in criminalistics, but like St. Mary Mead, Basel here becomes a backdrop against which to view the world.

But why Basel? The words of at least one prominent witness speak for the choice of the city on the knee of the Rhine: “Basel seems to me to be either at the heart of Christianity, or else to be situated not very far from it.” Enea Silvio Piccolomini, later known as Pope Pius II, wrote this on the occasion of the Council of Basel (1431 – 1449). To put it in today’s terms: What is special about Basel is not that this city is more closely linked than any other with world history, but the way in which it is linked. Whereby “world” here means not “the whole world” but rather “the surrounding world”, the concentrically expandable region around the city. Sometimes the impacts have extended far out over the world’s oceans, sometimes they have only effected Europe.

This book is an “essay” in the original sense, an experiment. It actually consists of a number of essays, freely formulated texts in a non-scientific language. It is a book that keep to the facts, while sometimes pointing up links with a certain relish and humour The choice of stories adheres to the same principle: whereas an attempt has been made to take the most important “world events” into account, the intention is not to flaunt achievement. The small, sometimes almost forgotten story is of equal importance.

How Basel changed the world could of course have many more pages and include, for example, the significance of the 20th century church father, Karl Barth, the first Indian rhinoceros worldwide to be born in a zoo, the impact on everyday life of those little helpers Valium and Ritalin, the

history of ready-made pastry, the links between capital, rum and the slave trade, the settlement of the dangerous giant hogweed in Europe or the birth of the concept of freedom from pain.

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“Sugar … spinach … haemoglobin.” The measurements of Gustav von Bunge

“100 g dry matter contain mg of iron: Sugar … 0 / Blood serum … 0 / Chicken egg white … trace / Honey … 1.2 / Rice … 1.0 – 2.0 / Pearl barley … 1.4 – 1.5 / Pears … 2.0 / Dates … 2.1 / cow’s milk … 2.3 / mother’s milk … 2.3 – 3.1 / Plums … 2.8 / dog’s milk … 3.2 / figs … 3.7 / raspberries … 3.9 / peeled hazelnuts … 4.3 / Barley … 4.5 / Cabbage, inner yellow leaves … 4.5 / Rye … 4.9 / Peeled almonds … 4.9 / Wheat … 5.5 / Grapes (Malaga) … 5.6 / Blueberries … 5.7 / Potatoes … 6.4 / Peas … 6.2 – 6.6 / Cherries, black, stone-less … 7.2 / Beans, white … 8.3 / Carrots … 8.6 / Wheat bran … 8.8 / Strawberries … 8.6 – 9.3 / Lentils … 9.5 / Almonds, brown skins … 9.5 / Cherries, red, stone-less … 10 / Hazelnuts, brown skins … 13 / Apples … 13 / Dandelion, leaves … 14 / Cabbage, outer green leaves … 17 / Asparagus … 20 / Egg yolk … 10 – 24 / Spinach … 33 – 39 / Pig’s blood … 226 / Hematogen … 290 / Hemoglobin … 340”

It was this table compiled by the Basel physiologist Gustav von Bunge (1844 – 1920) that consolidated the victory of spinach as the vegetable with the highest iron content. It was printed in the first edition of his *Lehrbuch der Physiologie des Menschen (Textbook of Physiological and Pathological Chemistry)* in 1901. The iron values rise as the list of substances proceeds: sugar has no iron, haemoglobin, the colour component of red blood vessels, has the most (moreover, haematogen is a substance that von Bunge himself first tracked down; the word “haematogen” – coined by him as a

transitional term – means blood-producer). Spinach is the last vegetable on the list, so it is the vegetable containing the most iron.

There is a decisive qualification, however, and this is mentioned in the first line of the list: “contained in 100 g dry matter”. Now we do not eat spinach in powder form. The plant consists to a good 90 % of water, meaning that what we eat only contains 3.3 to 3.9 mg iron per 100 g – which may make spinach an iron-rich vegetable, but does not achieve the outstanding values of the powder form.

Faulty reasoning: The spinach example is often used in reference texts and newspaper articles when writing about faulty reasoning. After all, this error had far-reaching effects: generations of children were fed spinach, although only very few of them like the bitter-tasting vegetable. There are even stories about mothers cooking vanilla pudding with spinach in the hope that this sweet camouflage might make eating it more pleasant for their children.

There was a similar trick behind the invention of the comic figure Popeye the Sailor Man in the USA in 1929; one year later, Popeye even made it into animated cartoons. In critical situations – not in his early years, but only when Popeye was used in nutrition campaigns – the sailor opened a tin of spinach and ate it. Immediately, he turned into a muscle man who overcame his opponents through the power of spinach. In any case, the sure winner in this early PR-campaign was the manufacturer of tinned spinach: consumption of it increased by a third as a result.

A thinker. But back to Basel and Gustav von Bunge. He was born in Dorpat (today Tartu, Estonia), where the family belonged to the small German upper-class. It was in Dorpat that he completed his chemistry studies and wrote his post-doctoral treatise in the field of physiology. He then went on to study medicine in Leipzig and Strasbourg and received a doctorate in medical science from the University of Leipzig. In 1885 he was appointed to a professorial chair at the University of Basel, where he lived, researched and taught until his death.

Gustav von Bunge was an excellent scientist with an equivalent reputation who opted to remain in Basel although he was offered professorships elsewhere. He is regarded as a trailblazer in many fields of physiological research: he laid the foundations for vitamin research, was a pioneer in the research of milk and mineral substances and he was among

the first to draw attention to the dangers of industrial sugar, alcohol and nicotine. Today he is mainly only referred to in two contexts: the spinach issue, and his support of the temperance movement. After all, von Bunge believed that excessive consumption of alcohol could lead to damage of the genome.

A thought. One important discovery by Gustav von Bunge was the role of iron in nutrition. In the course of his research on milk he established that this fluid actually contained very little iron (see the table above). However, as iron was already considered to be a vital substance at the time, von Bunge did research on new-born animals, wondering where young animals got the important iron from. His conclusions were astonishing, here too with reference to dry matter: in the case of mammals, the new-born animals get a large quantity of iron from their mother. Her depot is reduced in the first weeks of their life, but it is sufficient until the young animals are themselves capable of eating food containing iron. Von Bunge's prime example were guinea pigs: they eat greenery immediately after they are born, which is why their supply of iron is so small.

It was for this reason that the physiologist examined the iron content of different food stuffs, publishing his findings in a total of three successive textbooks which were issued in several editions and languages. This was how his table with the iron values was disseminated. The scientist was not only a theorist, but was also very interested in practical application, which led him to make concrete suggestions about nutrition.

Von Bunge found out, for example, that white flour contains very little iron: "In addition to the poor iron content of milk there is the surprising fact of lack of iron in the most important vegetable foodstuffs, cereals [i. e. grains], at least in the form in which they are generally eaten, that is, with their seed coat removed, the so-called bran. When rice grain reaches the market the coat has already been removed; it corresponds not to barley corn, but rather to pearl barley or white flour for bread. When flour is bagged the coat, the so-called bran, is separated from the flour. […] The iron in cereals is contained in the coat. Wheat bran contains five times as much iron as wheat flour." For this reason, von Bunge advocated whole grain bread: "Bran bread is four times better than white bread: 1. It contains more iron; 2. It contains more calcium […]; 3. It stimulates peristalsis thanks to its cellulose content […]; 4. It cleans the teeth." He suggested