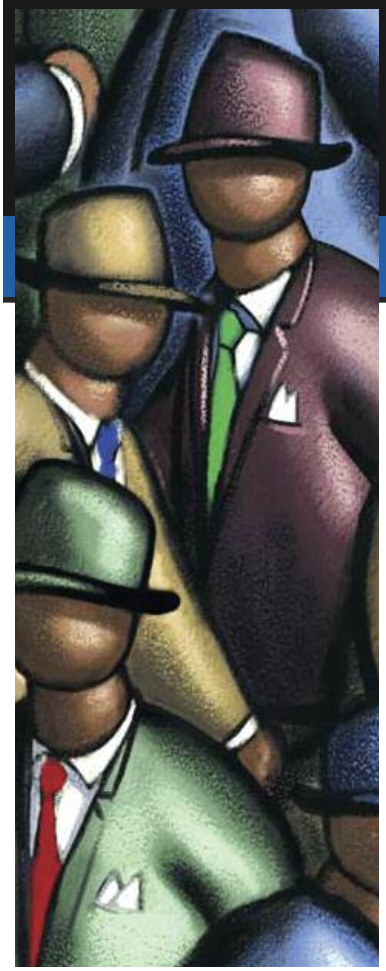
INTERNATIONAL MEN'S CLUB OF ZUG, P.O. BOX 7212, 6301 ZUG
Editor: Alan Cattell • email: Newsletter@imcz.club

IMCZNEWS

FEBRUARY / MARCH 2020



EDITORIAL

Mid winter – and as I write this it's 10 °C in Unterägeri – and raining. Not what I expect for this time of year. Hopefully there are a few more snow-days still this winter and the cross-country skiing will be able to start locally.

One of the highlights of our year, Burns Night, was held on 25th January. There is a short report on it in this edition. The even shorter version is: it was a great success. I heard nothing but praise for the evening and the speakers, sponsors, organisers and Brandenberg staff did an excellent job. Is it too early to look forward to the next time?

This month the club will have its AGM (27th, Parkhotel) and I encourage all of you to attend. It's your chance to have your say, to comment on the activities of the club and suggest any changes you would like to see. It's also your chance to hold the Board to account. I look forward to seeing many of you there.

As always, my thanks to all Newsletter contributors for their sterling efforts. I really appreciate their contributions and I trust you do too. As a reminder, I'm always looking for articles which you think might be of interest to the IMCZ members. They don't need to be long. If you have a topic you think is relevant (or just fun), please let me know. And don't worry about the language if English is not your mother-tongue; I am more than happy to help edit and structure your article till you're happy with the result (although some English people say that it's not my mother-tongue either).

So, to sign off in the spirit of Burns Night :
Here's tae us; wha's like us? Gey few, and they're a' deid' (you can google it) - **Alan**

Introducing… New members

THE IMCZ WELCOMES:

Markus Gysi

Markus is a "local local". Born in Zug and always living in the canton of Zug. He never had a reason to leave this beautiful place. Markus started his career as an architectural draftsmen then became a bricklayer. After that he studied as a Building Supervisor and worked a few years on this job, before he changed to the 'Zurich' insurance group as a Loss Adjuster. Markus is married and has two grown children. Dennis (24) and Kristina (22) have already moved out, but are still living in Cham, close to the parents. Sports of different kinds are the main passion of 'Kusi'; he was, for many years, a fencer and sailor and took part in a lot of competitions. Now he's a bit calmer, and likes cycling, swimming, cross country, stand up paddling and going to the gym. He's interested in music and likes to go to concerts as well. But for him, it is most important to enjoy life, connect with people and have interesting discussions with them about different topics.

IN THIS ISSUE

www.imcz.club

FUTURE EVENTS
FEBRUARY & MARCH '20

ENRICO DELL'ANGELO, EVENT'S ORGANISER

For information on all future events, and for registration where needed, please visit the IMCZ website "Events" section.
Please note – for some members only events you'll need to be logged in to see them.

Annual General Meeting (AGM) 27th February '20, Parkhotel, Zug

Please mark your calendars for our 2020 Annual General Meeting. All members are strongly encouraged to attend. The proposed agenda can be found here. Please review the minutes of the last AGM for their approval. You'll need to be logged in to see them.

Members may submit requests for additions to the agenda up to 20 days prior to the AGM. The President's and Event Manager's annual reports and the accounts with proposed budget for 2020 will be communicated in a special AGM Newsletter. We encourage all to arrive at 18:00 to "wet your whistles" before we settle down to business.

Summer Party / BBQ 23rd August '20

Block the date – the summer party has now been booked. We'll be in the Siehbachsaal again. Details on will follow nearer the time.

FUTURE EVENTS

IMCZ Ski Days
with Alpine Sports Andermatt
Saturday &/or Sunday March 28 & 29:

This is preliminary information on the proposed IMCZ ski day so you can block it in your diary. Joseph Dow and Enrico Dell'Angelo are organising a weekend skiing experience for the club. The proposed agenda is: Group ski/snowboard with one of Peter's expert instructors (alpinesportsandermatt.com), who will guide us around the Ski Arena area and provide tips & pointers on the Saturday. Sunday would be a free ski with an informal group.

Lunch is on our own
Option: we can have a group reservation at a mountain restaurant

Après-ski / Dinner on Saturday
Options: drinks at a local bar and/or a fine dinner at a restaurant

- Every participant brings their own equipment
- Must be at least a strong intermediate skier/snowboarder to participate in the dedicated Saturday group
- The partners of IMCZ members and ZIWC members are cordially invited

Additional details and registration information to come. You'll find updated information in the "events" section of the club website in the near future.

ZIWC Spring Dinner Dance

The ZIWC Events team is delighted to invite you to join us for a Spring Dinner Dance.

Date and time: Saturday 29 February 2020, 19.00-00.00
Where: Zunfthaus Kreuz, Artherstrasse 108, 6317 Oberwil. The restaurant & bar is located directly by the lake in Oberwil.
Dress Code: Party dress
Food & Beverages: Arrival Apero, 3-course dinner, wine & coffee.
Entertainment: Disco
Registration: Please register by contacting Jan Livesey, **annualevents@ziwc.ch**
Tables plan - table sizes vary from 6 – 8 persons. If you are booking a whole table please indicate the names of your guests at time of booking.
Costs: CHF 75 per person.
Payment: Please pay directly to Zug International Women's Club, 6340 Baar
IBAN CH40 0900 0000 1752 1935 3 referencing your payment with **Name** and **Spring Dinner Dance**.
Booking Deadline: Friday 21 February 2020.
How to get there: From Zug Bahnhof take bus number 5 direction Walchwil. Get off at Bus Stop Oberwil Kreuz, the restaurant is directly next to the bus stop .
Parking: Public car park opposite venue.
Contact: For questions only, Jan Livesey, **annualevents@ziwc.ch**
ZIWC Cancellation Policy (Article 4.f): The Club's cancellation policy is applicable to all events that involve a reservation and a monetary payment. Unless otherwise specified, the cancellation deadline is the reservation (Booking) deadline. A member who cancels her participation in an event, after the cancellation deadline, is required to pay the full participation fee of the event. Please advise your guests of this policy. **Accident Insurance:** Participation in any club event is at your own risk. It is each participant's responsibility to have personal and accident insurance.

PAST EVENTS

Burns Supper

Our 25th IMCZ Burns Supper was a great success. From all the feedback I received, everyone seems to have had a great time -and we managed to do better than the budget and break even for the event. This was largely due to a very successful raffle for which we managed to collect some highly attractive prizes. Our thanks goes out to all the sponsors of the raffle, including Parkhotel, the Freiruum, UBS, Bank Julius Bär, ZIWC Member Fiona Schaller, IMCZ Members Ian Stansfield, Martin Wrathall and Bas Veenendaal, 21st Century Orchestra and Wellart Medical. Thank you also to those who solicited the prizes from the sponsors.

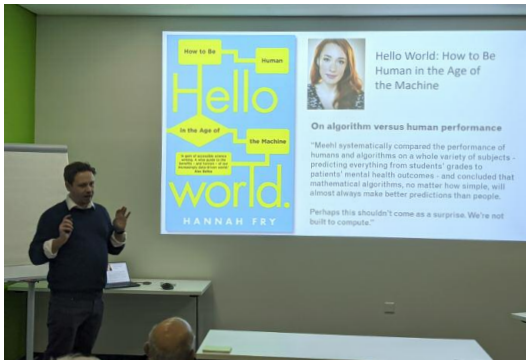
Steven Knight once again excelled as Master of Ceremonies, ensuring that the proceedings flowed smoothly, as did the whisky, of which there was plenty on hand. We enjoyed a large selection of aged Single Malts, procured by the Club President himself and the Club Treasurer. The Brandenberg team, headed up by Christian Hempel, once again took care of us wonderfully, bringing the 4 courses and drinks to our tables. This year, in a departure from previous years, we introduce a starter course of salmon salad, in place of a second chicken supreme main course. This was a well-received innovation. The Haggis received universal praise from everyone.

I would like to say a big thank you to all the other Performers, including Craig Holmquist the Piper, Alan Cattell, Bruce Webb, Fiona Schaller, Alina Kunz, Mandy Asimakopoulou and Roger Brooks. I believe there may have been some additional impromptu performances as well for which we were also thankful. So all in all, a great evening. Thank you to everyone who came along in support. IMCZ Members are encouraged to post their photos on our website Gallery.

Bill Lichtensteiger

Fluence

On 9th January we had a presentation by David and Jennifer Hore on their startup, Fluence. This exciting venture, based in Birmingham, applies Artificial Intelligence / Machine Learning to the analysis of documentation. Their vision is use this analysis to enable transparent and repeatable decisions in areas which depend on the interpretation of the written word. They have chosen to focus on regulated industries and their regulators.



In the UK alone, Regulators spend around £4bn per year looking after £154bn of UK business activity. The burden of regulation on these businesses is high. Today the vast majority of regulation decisions are subjectively based on policy and its associated documents. What Fluence have achieved is to use AI to make transparent how decisions are derived from the documentation and where there seem to be anomalies.

In developing their approach, they are working with selected regulators to demonstrate and validate the technology. For more details, see their presentation. The really exciting thing about their work is that it has the potential to enable regulators to frame their regulations in a way which is transparent and easily accessible to their regulated sector. They will be able to provide solutions, using Fluence technology and services, to their regulated businesses which will enable those businesses to ensure compliance. The whole nature of the regulator – regulated relationship could change from "policing" to "supporting".

For Fluence this is extremely exciting, as it creates the opportunity for them to support the regulated industries in partnership with the regulators. This eliminates many barriers to entry and reduces dramatically the end-customer sales and marketing effort.

Fluence is now in a fund raising round to go on to the next phase. They are currently in the process of raising money through an Advanced Subscription Agreement as a preliminary to raising significant venture capital. The ASA is aimed to finish in February '20.

For more information, see their presentation, their web site (https://fluence.world/) or contact Jennifer on jennifer@fluence.world.

Editor

Ski Q&A

Joseph Dow, IMCZ Sports' Editor

On 16th January Joe held a Q&A session around how to "travel light" to ski areas in Switzerland. He has produced a short article describing the event. It's in the Sports section so I won't duplicate the content here.

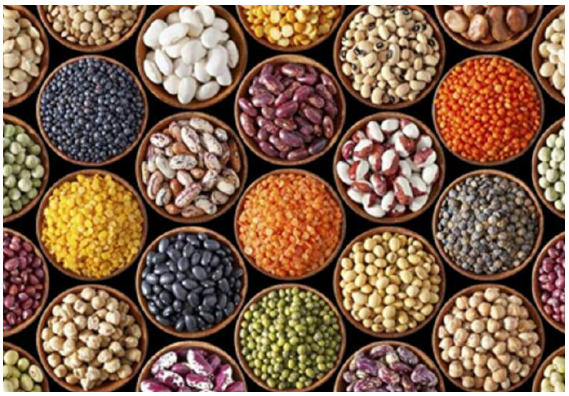
Editor

Protein Transition: How Feasible Are the Alternatives?

Contributed by Remo P. Jutzeler van Wijlen, Head R&D Sponser Sports Food Ing. Appl Food Sciences, MAS Nutrition & Health ETHZ

My first contribution in 2020 cites from an article about emerging protein sources of some years ago (van de Velde, 2016). Its implications are becoming ever more urgently important.

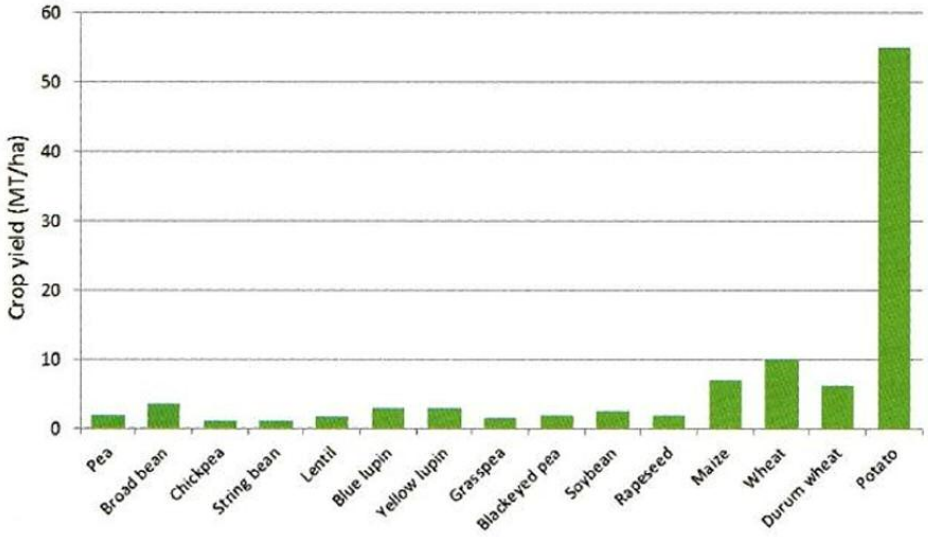
With the growth of the world's population and rising living standards, the demand for protein will continue to rise in the foreseeable future. It is obvious that traditional protein sources will not be able to keep up with this demand, and both industry and academia are urged to explore other options. Alternative sources of protein can include both animal and plant-based waste streams, alternative crops and other sources such as aquaculture, fungi, microbacteria, or insects. In general, plant proteins are perceived to be more sustainable than animal proteins. However, if new protein crops have to compete for scarce farmland, this raises the question of the extent to which such crops can contribute to the protein transition.

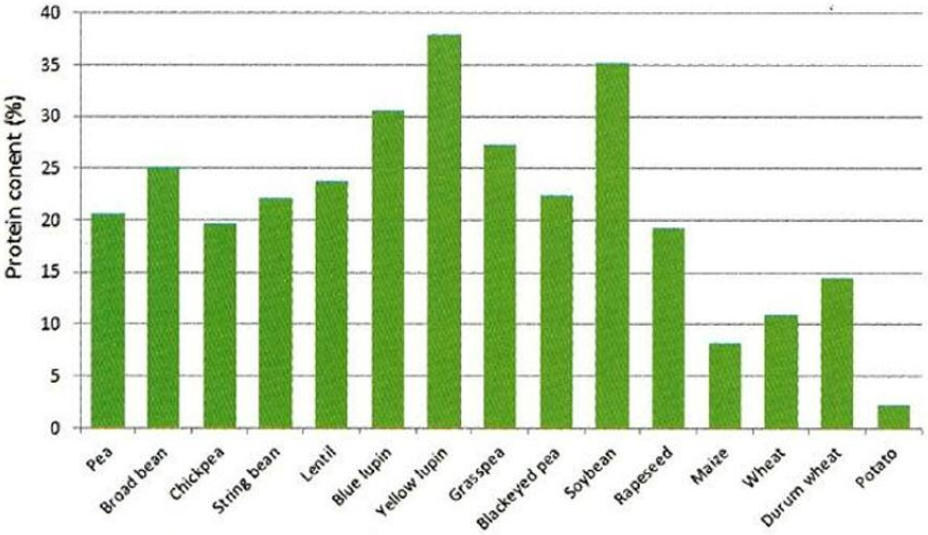


Many of the plant-based proteins currently available are by-products from other manufacturing processes. Soy protein, for example, is the by-product of soybean oil production and pea protein of pea starch production; potato and rapeseed proteins are other examples. To put it simply, production of protein is not the main focus of these industries. If, by contrast, we were to view protein as the main product, we would need to look at these crops in a different light. Combining data on the crop yield in weight per hectare (FAO, 2015) with the protein content of the various crops makes it possible to calculate a crop's protein yield per hectare.

The respective graphs clearly show that both the yield in weight and the protein content play an important role. For example, potatoes only contain about 2% protein, but this crop's high yield in weight per hectare still generates the greatest protein yield per hectare. However, the picture is not yet complete. There are other important considerations regarding the feasibility of a crop as a sustainable protein source, such as water and fertilizer use, resistance to diseases, climate requirements, and last but not least, the risk of allergic reactions in humans (e.g. lupin has a reported risk and, in particular, a significant risk on first-exposure). In terms of fertilizer use, legumes are an important group. Thanks to the natural symbiosis of these leguminous crops with nitrogen fixing bacteria (Rhizobium), these plants can fix atmospheric nitrogen (convert it to ammonia or similar compounds which plants can use). This means that legumes can be grown on little or no nitrogen fertilizer – and can even be used as green fertilizer for crop rotation purposes. With regards to these aspects, pea and fava beans turn out to be the most promising crop candidates for protein production purposes at our latitudes.

Even when comparing the nutritional value of different proteins, legumes show a better

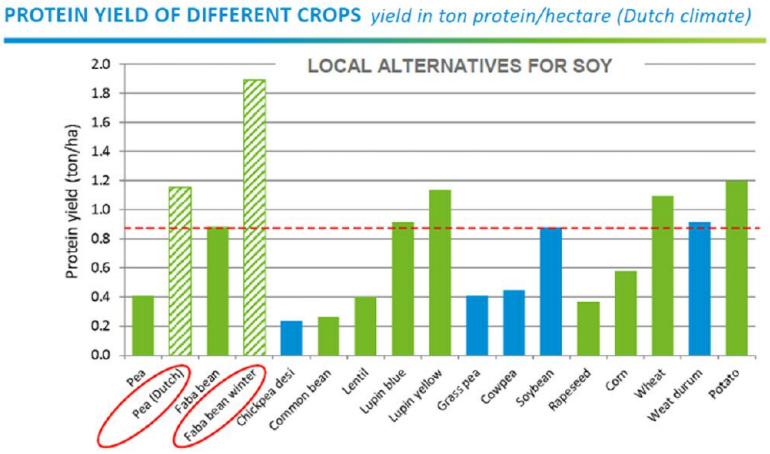


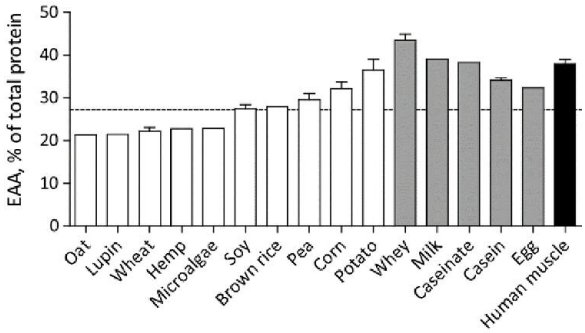


When vegans pose for photos.

bioavailability in terms of their essential amino acid (EAA) content than most plant proteins. Animal protein is always superior in this respect, however it suffers from being less sustainable. This is true even when taking its biological value into account (20 g of whey protein is approximately worth 30-40 g of plant protein).

However, despite all the described benefits of legumes, growing these crops will always have to compete with other agricultural crops. The importance of a productive and sustainable farming strategy for "protein crops" has also been recognised for some time by state actors like the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI: ec.europa.eu/eip/agriculture/en). In their starting paper from 2013 on protein crops they state that soybean meal is still the current main source of protein in the feed sector and acknowledge that there is growing concern about the production systems of soy and their impact (e.g. deforestation, water use, soil decline, biodiversity, etc.). Any contribution to the protein transition will encroach on other crops, which are similarly important for food production. From this perspective, focussing on crops only as alternative protein sources may not be the most promising route. I will continue the topic of emerging protein sources about potential sources like aquaculture and insects in my next article.





Investment Commentary January 2020

Contributed by IMCZ Member Christian Wagner
WAGNER & ASSOCIATES Investment Consulting

Economics And Politics

In Europe, Boris Johnson's landslide victory ensures Brexit on January 31, 2020. His proposed bill to limit the transition period for a new trade agreement to 12 months is ambitious but creates the necessary pressure to get things done. In sharp contrast, US Democrats are starting an impeachment process against President Trump which is almost impossible to win and could very well come back to haunt them by the next election.

Bond Markets

The longer than expected difficulties in the US money market (repo-market) are more serious than originally thought. Since the price cannot be found but has to be fixed by the Fed, it seems as if the market has almost been nationalized. The banks are making less liquidity available and other financial institutions and shadow banks need more; a continuing shortfall is dangerous.

Equity Markets

There is often talk about "blue sky" potential when an IPO comes to the market. In other words, about the price appreciation possibilities if expectations are surpassed. Markets are currently at a stage where they really need "blue sky" potential. The economic recovery still has to materialize, indebtedness is higher than before the financial crisis and the expansive money policy has reached its limits. The consequences of Brexit are still unclear, and the USA and China have only reached a "phase 1 agreement".

Currencies

The Swedish Riksbank, the first central bank to introduce negative interest rates in July 2009 and which holds the record of -1.25%, has given up its negative interest rate policy. On January 8, it will hike its key rate to 0%, and it could be the first step to normalize the interest rate curve. Since many economic figures (inflation, growth) are similar to those in the Euro area, the question is why? A weak currency and public pressure could be the answer but the realization that negative interest rates don't work anymore is the most likely.

Food For Thought

With the increasing digitalization of asset management, 3 aspects should be kept in mind. First, the well-known saying in the IT world GIGO (garbage in, garbage out) means faulty programming leads to useless results. Second, the impossibility of forecasting crashes like 1987 (portfolio insurance) or 2008 (securitization). Third, the prospect that traditional functions of equity markets (economic consequences, regulation of companies, financial stability) will be guided or even run by computers.

Christian Wagner,
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Tel. +41 (0)41 790 35 81

A History of Measurement Standards, 1799 to 2019

Contributed by IMCZ member, Alan Cattell

Introduction

Over the last century there has been a dramatic increase in the precision needed for many measurements. For example, Global Positioning Systems require multiple devices to have precisely the same value for time to nano second accuracy, or better. Silicon electronic components are manufactured routinely to dimensions in the sub-10 nano-meter range. Machines are produced to sub-micron tolerances. These are not "fringe" requirements needed only by a few. Many of these requirements underpin mass-market devices and services.

A hidden challenge behind all these developments is the accuracy of measurement. How do we ensure that the kilogram, meter, second, pound, yard etc. are the same everywhere? This has been the job of the various standards institutes. Overall responsibility lies with the International Bureau of Weights and Measures which is headquartered in Sèvres, France. This is an international body comprising 61 countries including Switzerland, the UK, and USA (not only "metric countries").

Until last year, some of these standards were defined by physical objects. For example, the *International Prototype of the Kilogram* is kept in a vault in Saint-Cloud, near Paris. Each of the major standards institutes had a copy and from these the various "working" copies for calibration purposes were derived.

However, physical standards are difficult to work with. Just using the prototype kg to make a copy results in microscopic changes in its mass. Accumulation of dirt increases its mass. Chemical changes are always a challenge. Cleaning decreases its mass. For length measurements the problem is similar. How accurately is the old "standard" meter bar machined? Today it's possible to measure length much more accurately than any physical bar can be produced.

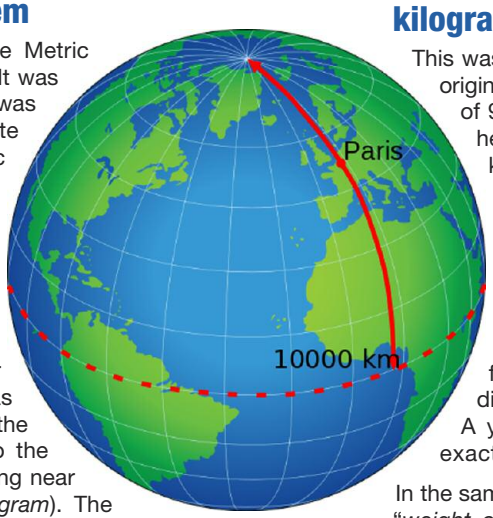
For all these reasons, the goal for many years has been to define the 7 fundamental units of measurement in terms of physical constants of nature. This has huge advantages. Ever more precise measurements can be made of a physical property as requirements for more accuracy increase. There is therefore no need to change the definition of a unit due to higher accuracy requirements (as has happened in the past). Each standards institute can define the fundamental units independently - and always get precisely the same result.

This dream was finally achieved last year.

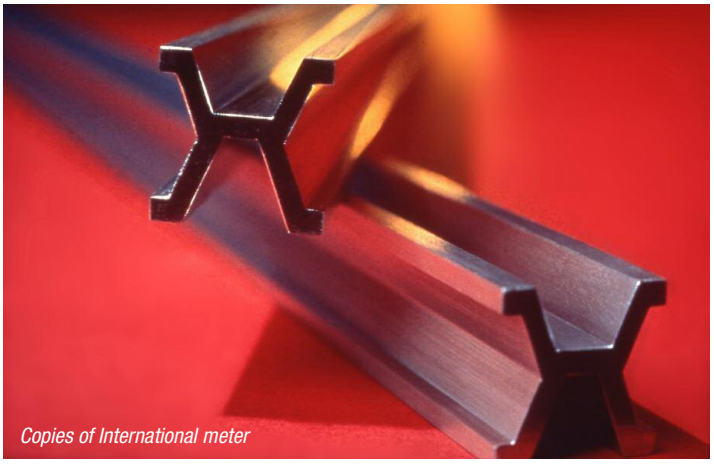
A history of measurement standardisation

1799 - The Metric System

The initial implementation of the Metric System was in France in 1799. . It was commissioned by Louis XVI and was the result of the need to consolidate a wide range of differing historic measurement "standards" into one workable approach, driven by the needs of industrialisation. The objective was also to base the standards on attributes of nature, rather than human derived measures. Two standards were initially defined – the meter and the kilogram. The meter was chosen to be one ten-millionth of the distance from the North Pole to the equator along the meridian running near Dunkirk and Barcelona (*see diagram*). The kilogram was to be the mass of 1 litre of water.

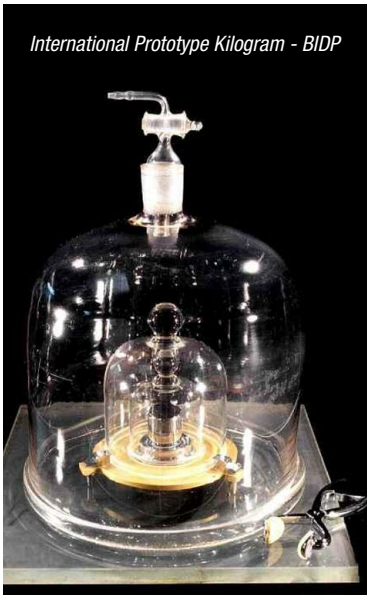


Initial "definition" of the meter



Copies of International meter

The original plan was that the unit of mass would be known as the "grave". However, politics around the time of the French Revolution led to the base unit being called the kilogram – so still today we have the bizarre situation of having a base unit with a "kilo" prefix!



International Prototype Kilogram - BIDP

1875 – The treaty of the meter

This international treaty was signed on 20th May 1875 by 17 countries, including France, Switzerland and the USA. This is the treaty which established the International Bureau of Weights and Measures (BIPM) mentioned in the introduction. It was the start of international measurement standardisation.

1889 – International Prototype kilogram and meter

This was built to provide a more stable, reliable prototype than the original French *Kilogramme des Archives*. For stability it was made of 90% platinum and 10% iridium; it is a small cylinder with a height and width of about 39 mm and was the standard for the kg till last year. Copies were made for other countries to act as their national standards.

A new international meter prototype was also made of platinum-iridium alloy to within +/- 0.0001 mm tolerances.

1959 – The international yard and pound

Due to stability problems with the physical standards used for the yard, and because the US and UK yard were slightly different, it was agreed to define the yard in terms of the meter. A yard is now 0.9144 m, which helpfully makes the inch exactly 25.4 mm.

In the same year, the pound (avoirdupois pound – from the French for "*weight of goods*") was defined in terms of the kg to be exactly 0.45359237 kg. The Troy ounce (from Troyes in France, used for

SI logo (BIPPM1)

precious metals mainly) is therefore defined to be exactly 31.103 476 8 grams because its relationship to the avoirdupois pound is fixed.

1960 – The International System of Units (SI) established

This (*first and only*) consistent system of units for all (known) physical quantities was established by the BIPM. It consists of 7 base units: time - second (s), distance - meter (m), mass – kilogram (kg), current - Ampere (A), temperature - Kelvin (K), amount of substance - mole (mol) and luminous intensity - candela (cd). There are also 22 named derived units for commonly used purposes (*see the box for details*). This initiative, started in 1948, was the culmination of a lot international work to agree a harmonised system of units. One of the major driving factors was the inconsistency between the previously established electrostatic units and the electromagnetic units which, with the increasing importance of electronics and electrical equipment, was a major problem.

The 22 Derived SI Units and their equivalents in SI base units

Name	Symbol	Quantity	SI base unit equivalent
Becquerel	Bq	radioactivity (decays per unit time)	s^{-1}
coulomb	C	electric charge or quantity of electricity	s·A
degree Celsius	°C	temperature relative to 273.15 K	K
Farad	F	electrical capacitance	$kg^{-1}\cdot m^{-2}\cdot s^{4}\cdot A^{2}$
Gray	Gy	absorbed dose (of ionizing radiation)	$m^{2}\cdot s^{-2}$
Henry	H	electrical inductance	$kg\cdot m^{2}\cdot s^{-2}\cdot A^{-2}$
Herz	Hz	frequency	s^{-1}
Joule	J	energy, work, heat	$kg\cdot m^{2}\cdot s^{-2}$
katal	kat	catalytic activity	$s^{-1}\cdot mol$
lumen	lm	luminous flux	cd·sr
lux	lx	illuminance	$cd\cdot m^{-2}$
Newton	N	force, weight	$kg\cdot m\cdot s^{-2}$
Ohm	Ω	electrical resistance, impedance, reactance	$kg\cdot m^{2}\cdot s^{-3}\cdot A^{-2}$
Pascal	Pa	pressure, stress	$kg\cdot m^{-1}\cdot s^{-2}$
radian	rad	angle	1
Siemens	S	electrical conductance	$kg^{-1}\cdot m^{-2}\cdot s^{3}\cdot A^{2}$
Sievert	Sv	equivalent dose (of ionizing radiation)	$m^{2}\cdot s^{-2}$
steradian	sr	solid angle	1
Tesla	T	magnetic induction, magnetic flux density	$kg\cdot s^{-2}\cdot A^{-1}$
Volt	V	voltage, electrical potential difference, electromotive force	$kg\cdot m^{2}\cdot s^{-3}\cdot A^{-1}$
Watt	W	power, radiant flux	$kg\cdot m^{2}\cdot s^{-3}$
Weber	Wb	magnetic flux	$kg\cdot m^{2}\cdot s^{-2}\cdot A^{-1}$

1967 – The second defined by the caesium atom (the so-called atomic clock)

Historically the second was defined by the length of a "day" on earth. However, the accuracy now required for time measurements mean that this is no longer acceptable, not to mention that the earth's rotation speed is slowing due to tidal effects of the moon.

The second was redefined by the frequency of transitions between two caesium 133 ground states. This is a quantum transition which depends on the electromagnetic properties of the specific atom and is very stable. The second is defined as the time for 9,192,631,770 "cycles" of this transition. This number was chosen to be as close as possible to the previous standard second. The second was therefore the first unit to be defined by a physical constant. The measurement is currently stable to 1 part in 10^{14}!

1979 – candela definition updated

Previous standards for luminous intensity were very difficult to make reproducible. There were definitions based on a "standard candle" using carbon filaments, or based on a literal candle of a given composition and burn rate. In the early 20th century an improved standard based on a "black body" radiation at the melting point of platinum was developed.

However, this was also not perfect as no ideal black body exists. In 1979 the candela (cd) was therefore defined based on a specific frequency of green light (540×10^{12} Hz) as 683 lumens per Watt. The frequency is in the part of the visible spectrum where the human eye is most sensitive. It's magnitude is close to that of the old "standard candle", but precisely reproduceable.

1983 – The meter defined by the speed of light

The older standards of length based on a physical object were becoming insufficiently accurate. By this time we knew from the work of Einstein, with a lot of experimental confirmation, that the speed of light in a vacuum is invariant, and is a true physical constant. The meter was therefore defined as the distance travelled by light in (1/ 299,792,458) seconds – as close to the old standard as measurement permitted.

2011 to 2018 –proposal to define ALL SI base units using physical constants developed

In 2011, the Ampere, meter, kilogram and mole were all still defined based on physical prototypes. The Ampere was defined based on the current needed to create a specific force between wires with a given separation. The mole was defined as the number of atoms in 12 grams of the isotope carbon 12.

The solution for the mole was easy. It was just defined to contain exactly $6.02214076 \times 10^{23}$ elementary entities. (This is known as Avogadro's number.) An elementary entity can be an atom, a molecule, an ion, an electron, any other particle or specified group of particles. There is no reason to link this number experimentally to a given material.

For the Ampere a similar approach was taken. It was defined by setting the value of the charge on an electron to be $1.602176634 \times 10^{-19}$ Coulombs (C), which is equal to an Amp.second. Since the second is already defined by the speed of light, the Coulomb is now defined by the electron charge.

The definition of the Kelvin is not so easy to understand. It's defined by setting the Boltzmann constant to be $1.380\ 649 \times 10^{-23}$ Joules per Kelvin.

The Boltzmann constant, which is used in both classical and quantum physics, relates the amount of heat in an object to the temperature of that object. As a simple example, from school physics; for an ideal gas, the pressure (P), temperature(T) and volume(V) of a gas are related by PV=kNT where k is the Boltzmann constant and N is the number of molecules of gas. Obviously, if you know P, V, and N, and k is a set constant, then you know T. This (in a much more sophisticated form) is the basic principle for defining T in Kelvin.

The kilogram (kg) is defined by taking the fixed numerical value of the Planck constant h to be $6.62607015 \times 10^{-34}$ J s, which is equal to kg m^2 s^{-1}, where the meter and the second are defined. This is much

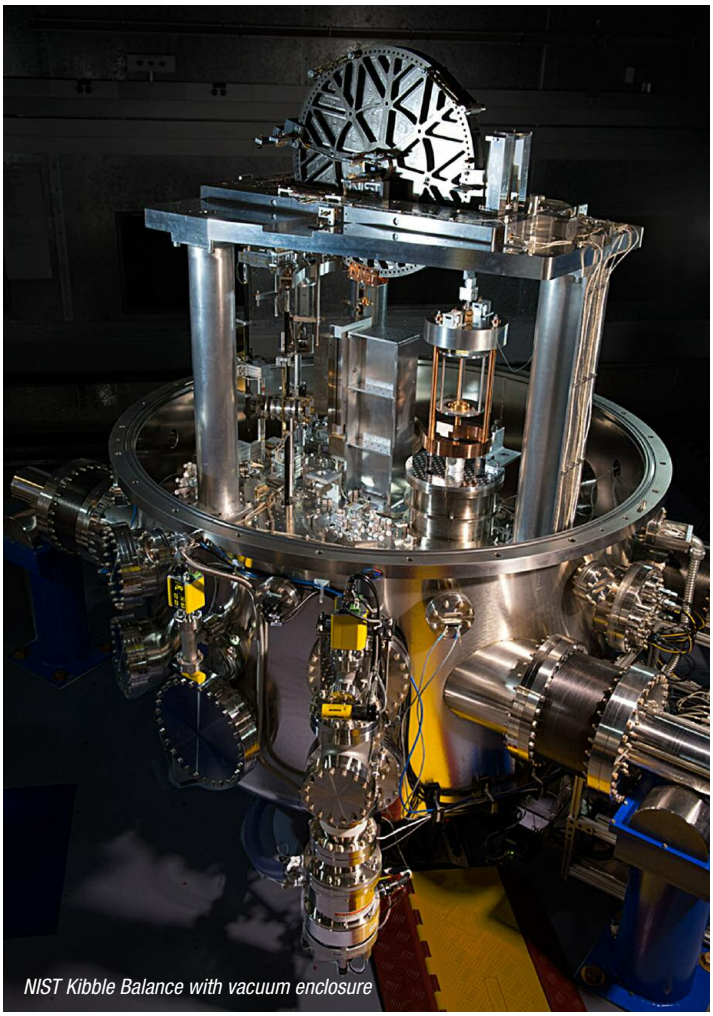
more difficult to understand as, at first glance, the link between mass and the Planck constant (which is the ratio of the energy of a photon to its frequency) is not obvious. Such a definition was not practical before the invention of the Kibble balance; more about that later.

November 2018 – Revised SI agreed

The 60 BIPM member nations unanimously approved the proposed new SI based on physical constants. It was agreed that it would come into force on World Metrology Day in May 2019, which it did.

All measurement units now derived from physical constants

So now we have a systematic framework for measurement units which is internally consistent and usable without having to remember conversion constants. Other units (pounds, yards…) are also defined from these units. Standards can now be determined from universal physical constants, independently by any organisation which wishes to do so. These measurements can be done anywhere, not only in the vicinity of our solar system. Improved measurement accuracy will no longer lead to the need to change the defining physical entities and can be worked on as the need for higher precision arises. The only "open" issue is whether we will discover new physical properties which will require additional base units – but that is pure speculation at the far frontiers of science fantasy. With these developments, the original vision of the "*Kings Commission*" of 1799 has finally been realised: a systematic system of measurement linked fundamentally to nature.

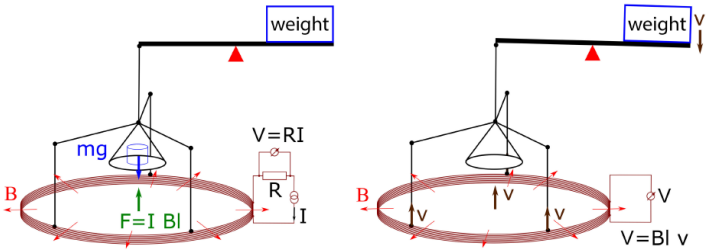


NIST Kibble Balance with vacuum enclosure

The Kibble Balance

To define the kilogram in terms of Planck's constant, a new measurement methodology was developed from work done initially to define the Ampere. It is based on the Kibble balance, named after its proposer, Dr. Bryan Kibble, a metrologist at the NPL.

This is no trivial piece of equipment as you can see from the picture. However, the basic idea is simple even if the details are rather complex. An electrical coil is placed in a permanent magnetic field and the current passing through the coil is used to balance the mass to be weighed. (The same principle is behind traditional loudspeakers construction.) A counterbalance weight ensures that, without the mass, the whole arrangement is approximately in balance.



Schematic of Kibble balance operation modes

The balance works in two modes. The weighing mode (left hand image) applies a current to the coil in the permanent magnet (not shown) and this generates a force to counteract the force of the mass in earth's gravity (g). Precision voltage measurement using superconducting Josephson junctions (which is where the Planck constant comes into play) and laser based position measurement ensure accuracy. However, the magnetic force (I Bl) cannot be calculated sufficiently accurately as it depends on the physical shape and properties of the coil and the permanent magnet.

To eliminate this uncertainty, the second measurement mode is used. Here, the coil is moved at a constant velocity through the permanent magnetic field. This generates a voltage which is also proportional to Bl so the uncertainty can be removed. In the end there is a linear relationship between the mass to be measured and the Planck constant with the precision depending only on the measurement of the velocity of the coil in the second mode, the value of the gravitation constant locally (measured separately using a gravitometer and the voltage measured in each mode.

Today's equipment is capable of measuring mass to an accuracy of 1 part in 10^8, and will doubtless be improved over the coming years.

Further Reading and references

1. The SI logo is the property of BIPM and subject to the licence in this link.
2. NIST SI Redefinition Portal (US National Institute of Standards and Technology)
3. SI gets a makeover, Physics World, 3rd November 2018
4. BIPM
5. The Kibble balance and the kilogram (Comptes Rendus Physique, Volume 20, Issues 1–2, January–February 2019, Pages 55-63

Telepathy Real or Imagined?

Contributed by IMCZ honorary member Muthana Kubba

An age old issue, which has never been really resolved. On the one hand, each and every one of us has, at one stage of his or her life, experienced something like it in one form or another. Think of something and suddenly your companion starts talking about the very issue you were thinking about, or all of a sudden you think of a particular person and unexpectedly the telephone rings and it is none other than the very person you were thinking of. However, on the other hand there has been no scientific proof that it exists, nor indeed is there a satisfactory explanation of it.

Broadly speaking telepathy is about communication of thoughts or ideas by no visible or known means. The nagging question about it has been and always will be: is it science or pseudoscience? Well-designed experiments have long been criticized for lack of proper control and, above all, lack of repeatability.

Personally, I will never forget a phenomenon which happened to me as a young kid of 9 years. I was in the third year class of a primary school in a south province of Iraq (Shatra). The Arabic language teacher was quite strict. He used to come in and order us to open the textbook on a particular page and start reading. No way to cheat or prepare beforehand. I vividly remember him barging in and demanding that we open page 169. The hustle of the whole class clamouring to get the text book, and find page 169 was quite loud. I was sitting on the front row, but was very quiet and didn't move or attempt to find the said page. Annoyed, the teacher approached me to find out why I was ignoring his request. He was truly shocked when he found out that the textbook was already opened on the said page. I have no idea how or why I did it, except perhaps to annoy an unpleasant teacher.

Evidence

What complicates matters is the fact that 'telepathy' is often conflated with other phenomenon, like thought-reading, clairvoyance, precognition, ESP (Extrasensory Perception) etc. In order, however, to make a start let us simply concentrate on telepathy in its simplest form, namely the direct transfer of thought from one person to another without using any form of the usual sensory channels.

When it comes to presenting hard, solid, tangible *and* 'repeatable' experiments which science would accept as evidence, we hit a solid wall. No scientifically accepted experiment has been conducted which show that 'telepathy' actually takes place. This is not for lack of effort. Many studies have been conducted. To appreciate the tremendous efforts that have been put into this issue over the years and centuries, below are some of the experiments reported

- Zener Cards. This is a deck of 25 cards, five of each symbol. It is used to check telepathy and was first suggested by Karl Zener in the early 1930's. In a test a subject has to guess the symbol of a card picked up at random from a shuffled pack. In several tests the probability of guessing the correct card symbol was no more than average.
- Several experiments were performed in the 1930's to find out if telepathy at a distance exists. They placed the subjects several hundred kilometres apart and carried out their experiments. Between 1941 and 1943, two researchers Samuel Soal and K.Goldney examined 160 subjects in over 128000 trials, the results after scrutiny were negative.
- Telepathy between twins was also thoroughly investigated. Several studies were carried out and all proved negative. To quote just one, in 1993 Ms Susan Blackmore investigated this claim. She carried out the experiment with six sets of twins, one subject would act as a sender and the other as the receiver. The sender was given selected objects, photographs or numbers and would attempt to send the information telepathically to the receiver. The results were negative and no evidence of telepathy was observed.
- Even the National Research Council of the United States of America had commissioned a panel to study and report on paranormal claims. It concluded that in spite of 130-year record of scientific research, no scientific justification for the existence of paranormal or mental telepathy exists. All claims for the existence of telepathy were based on poorly designed experiments and/or procedures - meaning they did not eliminate bias in the methodology

Conclusion

Taking into consideration the myriads of experiments performed to find out if telepathy can be proven and the huge amount of literature describing it, we must reach the conclusion that telepathy is both real and imaginary. Real because it happened to each and every one of us at some stage in our lives, and imaginary because it is not reproducible under controlled conditions.

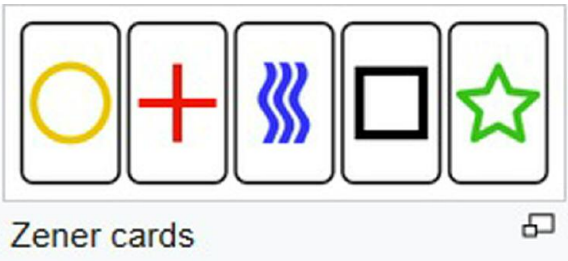
Personally, I think we are missing something. May be there are other channels of communication besides EM (Electro Magnetic) waves, maybe there is a further dimension in our sensory organs of which we are not aware. Who knows, there may be even be "blitzes" of some form of energy which momentarily open up windows of consciousness for very short periods of time allowing telepathic waves to travel. The answer may come out one day, however, in all probability not during our lifetimes.

Further Reading

Wikipedia
https://en.wikipedia.org/wiki/Telepathy

Psychology Today
https://www.psychologytoday.com/gb/blog/debunking-myths-the-mind/201804/the-biology-telepathy

Zener Cards
https://en.wikipedia.org/wiki/Zener_cards



Iceland Islands

Contributed by IMCZ Webmaster Roger Brooks

Departing from Reykjavik (or more precisely, Suðurhöfn, an industrial port in Hafnarfjordur, about 20 km south of Reykjavik), our voyage around Iceland took us first to the port of Ísafjörður and the nearby island, Vigur.

Ísafjörður

Ísafjörður is, despite its modest population of a few thousand, the largest town on the north-western peninsula of Iceland known as Westfjords and has one of the largest fisheries in Iceland. Its name means "ice fjord" and it is located off a similarly named fjord, Ísafjarðardjúp, which, at 75 km in length, is the largest in Iceland. Instead of visiting the town, we opted for an excursion to the nearby island of Vigur, which is famous for its bird life and is nicknamed "Paradise Island" or "Pearl of the Westfjords".

Vigur Island

Vigur is the second largest island in the fjord Ísafjarðardjúp, about 2 km long and 400m wide. When we were there, it was being managed by a family in the sixth generation, the only year-round residents. Relatives would come from the mainland to help out during tourist season. Besides tourism the main industry was eiderdown, which the locals would collect from the nests of the eider ducks. In turn, the locals, with the help of the arctic terns, protected the ducks from predators. Many of the birds for which Vigur Island is famous, such as puffins and guillemots had already abandoned the island for the winter, but we saw some of the aforementioned ducks and arctic terns, as well as some sandpipers. Although it wasn't sunny, seals were also basking on sandbars near the shore.

Settlement on Vigur Island

Seals Basking off Vigur Island

The Eider Duck Hotel

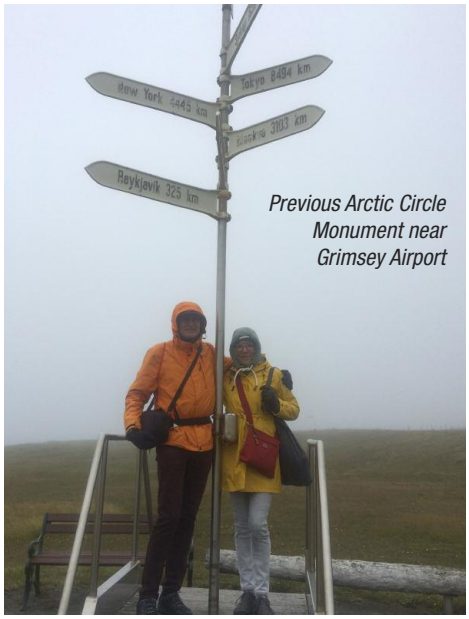
After a short walk around the island, we enjoyed a brief guided tour. We admired a guano-bedecked sculpture of the head of Sigurður Bjarnason, a man from Vigur who became a famous politician in the Icelandic Parliament, Althing. The sculpture stands near an old, 8-person rowboat called Breiður, which was built around 1800 and is still seaworthy. It is taken out to sea at least once a year to keep it from drying out and developing cracks in the caulking. Nearby is also a low stone wall said to be of similar age, which is jokingly called the 'The Eider Duck Hotel', as it is full of cubby holes which the ducks like to nest in and was evidently built to house them.

Vigur is also home to a windmill which dates back to the mid-19th century, when it was used to mill grain. It is the only windmill in Iceland which survives from that era and it is owned and maintained by the National Museum of Iceland, which also owns a restored Victorian house on the island. At the time we visited, the island was up for sale (for 2-3 M EUR). An offer from another Icelandic family, who intended to continue to manage it in similar style, had already been approved. However, there were numerous other offers (mostly from foreigners) and Icelanders fearing the loss of public access in the event of a private purchase were putting pressure on the Icelandic government to buy the island. The island has since been sold, but I was unable to ascertain who ultimately bought the island.

Grímsey Island

After departing Ísafjörður, we sailed around to the northernmost inhabited place in Iceland,

Statue of Sigurður Bjarnason, Famous Politician from Vigur



Previous Arctic Circle Monument near Grimsey Airport

Arctic Circle Marker on Grimsey Island

Grimsey Island. Grimsey lies about 40km north of the Icelandic mainland. The northern tip of Grimsey lies north of the Arctic Circle. However, since the Arctic Circle is defined by the region where the sun is below the horizon for at least 24 hours in winter, it isn't geographically fixed. Due to the precession of the Earth's axis, the Arctic Circle is currently moving north by about 15 m per year and will leave Grimsey Island in the next 20-30 years.

Grimsey is home to only a few dozen people and nearly as many horses, but it has its own airport, with a 1km runway. Its principal industry is fishing. Politically Grimsey belongs to the community of Akureyri on the mainland. Although our cruise ship held less than 200 guests, it was too large to dock in the port of Sandvik, the northern part of the only settlement on Grimsey. We landed by tender boat and took a modest hike around the island.

We started by hiking north along the western coast. Following a sign along the way, we found a monument marking the Arctic Circle just a bit inland (toward the airport) from the main path along the coast. We only found out subsequently, that it no longer marked the correct location, but more about that later. Turning east, we passed around the northern end of the airport runway, which launches planes into the prevailing wind over the coastal cliff at Stekkjarvik. On the way to the north end of the island we saw several dead terns, which we were told had probably died naturally. Perhaps they waited too long to migrate south. Arctic terns migrate between the Arctic and Antarctic and consequently have the longest migratory journeys of any species. They can live for over thirty years.

Along the way, we teamed up with another couple we had befriended on the ship. Eventually we reached the (current location of the) arctic circle, which is marked (as nearly as possible, since it is in motion) by a spherical concrete boulder, called "Orbis et Globus" (Circle and Sphere). The monument was commissioned in 2013 as the winner of a contest to design a movable monument to mark the position of the Arctic Circle on Grimsey. It was made in 2015 and is 3m in diameter. Due to its weight of 8 tonnes, which keeps it from being blown out of position by Grimsey's winds, it isn't *that* movable and was only first positioned and inaugurated in 2017. It supersedes the monument we passed near the airport as well as static markers further south, which marked the locations of the Arctic Circle going back three centuries.

Except for the harbour area on the southwestern coast, Grimsey's shores consist of steep cliffs, which offer nesting places to a variety of sea birds. The puffins had all flown away for the winter, but there were still a number of kittiwakes nesting on the northern coast of the island. We watched for a while as they sailed on the north-westerly winds and then made our way back south along the eastern coast of the island. On our way, we encountered a dozen or so Icelandic horses. They were very friendly, nudging and rubbing us and nibbling at our bags and jackets. They were probably hoping for something to eat, but none of us had brought anything suitable. After a brief pause to pet them and scratch their heads, we resumed our journey south. We left the coastal path and passed a prominent radio antenna tower on the crest of the island (100 m above sea level) as well as the south end of the airport runway on our way back to Sandvik.

Walking south from Sandvik along the western coast, we got as far as Miðgarðar, where we paused to admire the local church, Miðgarðarkirkja. It was built out of driftwood in the mid-19th century and renovated in the mid-20th century. The church Is surrounded by a well-kept graveyard. Just to the south of the church are an impressive collection of basalt columns, evidence of Iceland's volcanic history. Similar sites exist around Grimsey and at other locations in Iceland, but the most impressive that we have seen are at the Giant's Causeway in Northern Ireland.

Heimaey (not)

After returning to the ship from Grimsey, the Captain invited us to a presentation in which he informed us of the weather brewing on the south side of Iceland. He showed us graphics predicting stiff south-easterly winds and 5m swells on the southern coast and warned us that we might not be able to make port at Heimaey, Iceland's largest coastal island and the last one on our itinerary. In fact, we did wind up leaving out that port of call, but more about that in the next instalment.

Basalt Columns on Grimsey Island

Further Information

https://www.akureyri.is/grimsey-en/moya/news/orbis-et-globus-circle-and-sphere-1
https://www.pri.org/stories/2018-10-15/iceland-shifting-sculpture-changing-arctic
https://en.wikipedia.org/wiki/List_of_places_with_columnar_jointed_volcanics#Europe

THINK SNOW!!!

Skiing Discussion & Upcoming IMCZ Andermatt Ski Weekend

Contributed by IMCZ Sports' editor Joseph Dow

Ski Q&A Session

Recently at the Club's Thursday night Stammtisch, I answered questions and presented my experiences and recommendations from twelve years of skiing all over Switzerland. With the unique Swiss rail system and my GA railpass, it has been possible for me to ski most of the Swiss ski areas from the biggest (*Zermatt, Portes du Soleil, St. Moritz and Verbier*) to some of the smallest (*Splügen, Belalp, Bellwald and Braunwald*).

From these trips, I've discovered gear and developed strategies to make the experience as easy as possible. Back in the December issue, I provided a list of gear that has worked best for me and is particularly useful for skiing in Switzerland, especially if traveling by public transport. At the talk, I displayed my usual gear and described what makes it the most appropriate for the task. If you missed the Q&A session, feel free to drop me an email or ask me a question at an upcoming Stamm about skiing in Switzerland and gear recommendations.

Andermatt Trip

Also, the Club and I have organized another ski weekend for the IMCZ, coming up at the end of March (28th and/or 29th). If you would like to participate, please see the trip announcement in this issue of the newsletter and consider registering. We will soon need a minimum number of committed participants to reserve a mountain guide to make it a unique experience.

This year, we have chosen the SkiArena Andermatt-Sedrun. It's a great area with a lot of new lifts and terrain and there is a good chance for nice weather and good snow in late March. We plan to engage former member Peter Widdup's Alpine Sports Andermatt to provide us with an expert guide to show us around the area and give group tips and pointers about technique and information about the SkiArena area.

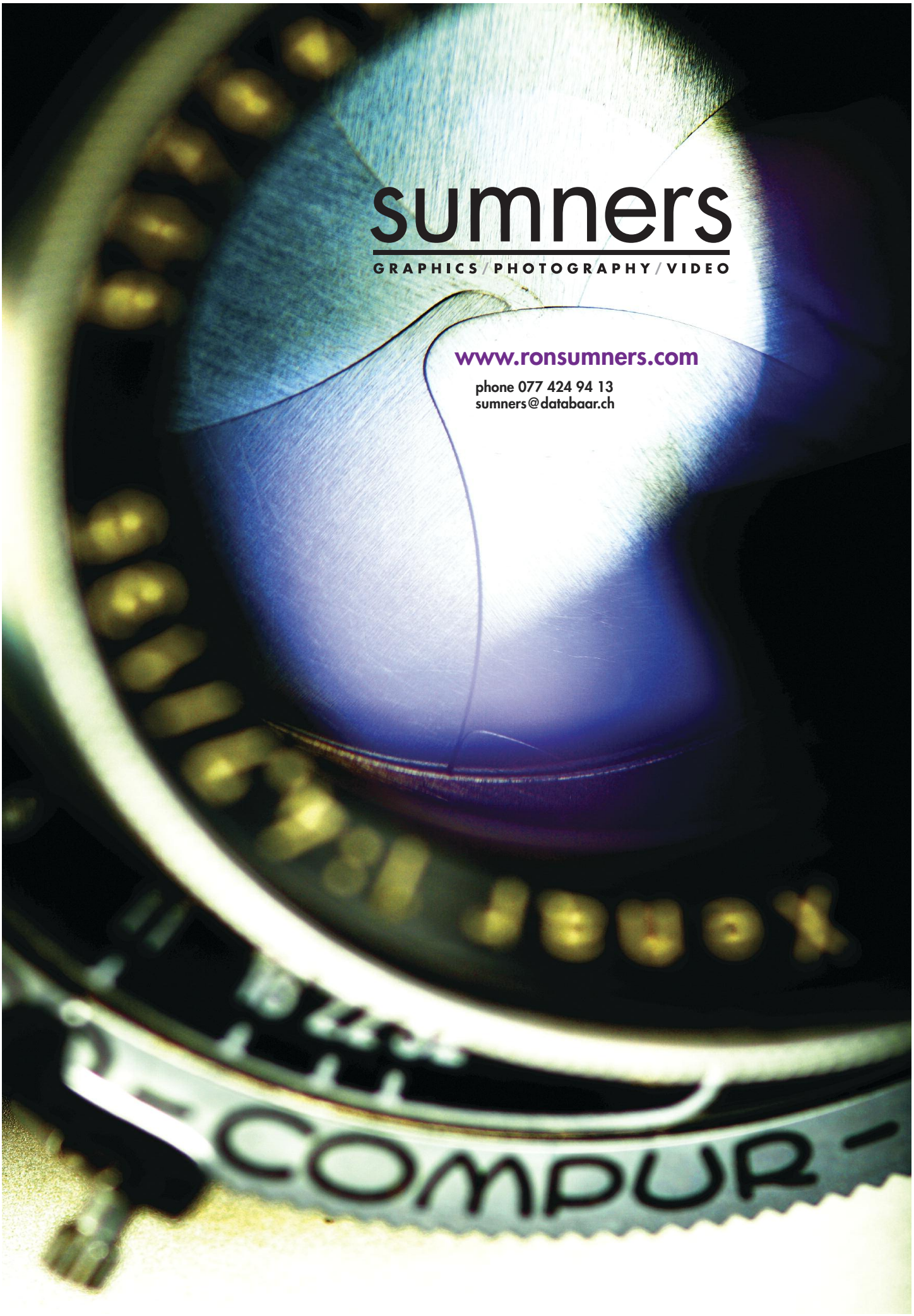
Views around Andermatt

Additional Information:

- **SkiArena Andermatt-Sedrun:**
  skiarena.ch
- **Alpine Sports Andermatt (Peter Widdup):**
  alpinesportsandermatt.com
- **SBB Snow 'n Rail program:**
  sbb.ch/en/leisure-holidays/leisure-offers/snownrail.html
- **REGA:**
  rega.ch/en/
- **Swiss ski conditions:**
  snow.myswitzerland.com/snow_reports
- **Exped Packs:**
  exped.com/switzerland/en
- **POC Sports:**
  pocsports.com
- **Fast Strap:**
  faststrap.com
- **Buff Bandana:**
  www.buff.com/nl/polar-bandana-buff-metal-leopard-multi.html
- **Hestra Gloves:**
  hestragloves.com
- **On Waterproof Sneakers:**
  www.on-running.com/en-ch/collection/no-excuses

THINK SNOW!!! THINK SNOW!!! THINK SNOW!!!
THINK SNOW!!! THINK SNOW!!!

If you have questions about skiwear or equipment or want a recommendation, feel free to send me an email: jjdow[at]hotmail.com.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COMPUR

Corporations around the world

An American Corporation
You have two cows.
You sell one, and force the other to produce the milk of four cows.
You are surprised when the cow drops dead.

A South African Corporation
You have two cows.
You go on strike because you want three cows.
They get stolen, so you blame the previous regime and steal someone else's cows and shoot the owner.

A Zimbabwean Corporation
A farmer has two cows.
You take over his farm, eat both cows, and wait for the international community to supply more.

A Japanese Corporation
You have two cows.
You re-design them so they are one-tenth the size of an ordinary cow and produce twenty times the milk.
You then create clever cow cartoon images called Cowkimon and market them worldwide.

A German Corporation
You have two cows.
You re-engineer them so they live for 100 years, eat once a month, and milk themselves.

A British Corporation
You have two cows.
Both are mad.

An Indian Corporation
You have two cows.
You pray to them for food.

An Italian Corporation
You have two cows, but you don't know where they are.
You break for lunch.

A Russian Corporation
You have two cows.
You count them and learn you have five cows.
You count them again and learn you have 42 cows.
You count them again and learn you have 12 cows.
You stop counting cows and open another bottle of vodka.

A Swiss Corporation
You have 5000 cows, none of which belong to you.
You charge others for storing them.

A Chinese Corporation
You have two cows.
You have 300 people milking them.
You claim full employment, high bovine productivity, and arrest the newsman who reported the numbers.

An Australian Corporation
You have two cows.
The one on the left is kinda cute ...

Camping Trip

Sherlock Holmes and Dr. Watson went on a camping trip. After a good meal, they lay down for the night and went to sleep. Some hours later, Holmes awoke and nudged his faithful friend. Holmes said: "Watson, look up and tell me what you see".

Watson said: "I see a fantastic panorama of countless stars."

Holmes: "And what does that tell you?"

Watson pondered for a moment: "Astronomically, it tells me that there are millions of galaxies and potentially billions of planets. Astrologically, I observe that Saturn is in Leo. Horologically, I deduce that the time is approximately a quarter past three. Theologically, I can see that God is all powerful and that we are small and insignificant. Meteorologically, I suspect that we will have a beautiful day tomorrow."

"Why? - What does it tell you, Holmes?"

Holmes was silent for a moment then spoke: "My good Watson... someone has stolen our tent."

Parental Concern

The mother of a 17-year-old girl was concerned that her daughter was having sex...

Worried the girl might become pregnant and adversely impact the family's status, she consulted the family doctor.

The doctor told her that teenagers today were very wilful and any attempt to stop the girl would probably result in rebellion. He then told her to arrange for her daughter to be put on birth control and until then, talk to her and give her a box of condoms.

Later that evening, as her daughter was preparing for a date, the mother told her about the situation and handed her a box of condoms.

The girl burst out laughing and reached over to hug her mother, saying, 'Oh Mom! You don't have to worry about that! I'm dating Susan!'

A Good Sermon

A man went to church one day and afterward he stopped to shake the preacher's hand. He said, 'Preacher, I'll tell you, that was a damned fine sermon. Damned good!'

The preacher said, 'Thank you sir, but I'd rather you didn't use profanity.'

The man said, 'I was so damned impressed with that sermon I put five thousand dollars in the offering plate!'

The preacher said, 'No shit?'

Medical Problem

Brenda and Steve took their six-year-old son to the doctor.

With some hesitation, they explained that although their little angel appeared to be in good health, they were concerned about his rather small penis.

After examining the child, the doctor confidently declared, 'Just feed him pancakes. That should solve the problem.'

The next morning when the boy arrived at breakfast, there was a large stack of warm pancakes in the middle of the table.

'Gee, Mom,' he exclaimed. 'For me?'

'Just take two,' Brenda replied. 'The rest are for your father.'

Members' Marketplace

*Are you **selling** your yacht (harboured in Piraeus)?*
Your Aston-Martin old-timer with the roll top roof?
A gorgeous view of the Bay of Biscay,
with a little bit of house attached?
Or are you cashing in the half of your stamp
collection that is finally worth something?
*Perhaps you're **looking** for all of these things?*

Then ADVERTISE here, in the IMCZ News;

The Members' Marketplace is reserved for unformatted advertisements of 150 characters (approx. 3 lines) of text.
These are free of charge to IMCZ members.
Advertisements must be submitted as illustrated below.
Longer advertisements cost CHF 30.-

Example: **FOR SALE:** gorgeous view of Bay of Biscay with stunning sunsets and high waves. Wee house (12 rooms), dock and yacht included. Call Bill at 041 123 45 67.

your text here.

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The IMCZ newsletter is delivered bi-monthly to about 200 members representing 20 nationalities. IMCZ members have personal or professional interests in both the international community and in the canton of Zug.

Format: A4 vertical, full color.

Ad content delivery:
electronic by e-mail, .pdf, .jpg, .gif

Advertising Rates:

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- **1/2 Page, A5 horizontal (19 x 13.5 cm), Fr. 110.-**
- **1/3 Page, vertical (6.3 x 27.7 cm), Fr. 85.-**
- **1/3 Page, horizontal (19 x 9.2 cm), Fr. 85.-**
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