

THE 5th EUROPEAN GIRLS' MATHEMATICAL OLYMPIAD

Luxembourg Leader's Report

In mid-April 2016, Romania hosted the fifth European Girls' Mathematical Olympiad (or EGMO to its acolytes), following onto the previous editions of this competition in the United Kingdom in 2012, in Luxembourg in 2013, in Turkey in 2014, and in Belarus in 2015. Buşteni welcomed 147 contestants from 39 countries, among which were 28 contestants from 8 guest nations from all over the world.

At EGMO 2016, Luxembourg was represented by two contestants:

LUX1 Luana Capus Lycée Hubert Clement, Esch-sur-Alzette

LUX2 Lea Menasce Lycée de Garçons, Luxembourg

The team leader was Pierre Haas. Charles Leytem, Luxembourg's representative on the EGMO advisory board, also attended the competition. More or, in many cases, less flattering mugshots of participants can be found at the official internet side of EGMO, <http://www.egmo.org>, where the interested reader may find virtually any information on EGMO, ranging from results of past competitions to detailed explanations, cast in soporific legalistic parlance, of what constitutes "force majeure". For those whose intellect craves for something beyond sobre statistics of results, the present report aims at giving a more buoyant description of EGMO.

As its mother competition, the International Mathematical Olympiad (IMO), EGMO is a competition among individuals engaging in the chivalrous fight for shiny metal, but a ranking of nations is published and carefully scrutinised by team leaders. As usual, Luxembourg was the leading Grand-Duchy, which, given the fact that this was the only ranking that Luxembourg came top of, emphasised the advantage of having an arcane form of government. It is fortunate indeed that monarchist tendencies have failed to garner support in the former Grand-Duchy of Finland.

A Brief History of EGMO

The first question about the European Girls' Mathematical Olympiad clearly has to be: why is there such a thing? The reason is simply that, over the past years, about one in ten participants at the International Mathematical Olympiad has been female (although some of the most successful IMO contestants of all time have been female). This is clearly undesirable¹; mathematical competitions for girls therefore aim to encourage more girls to take part in mathematical olympiads. One of oldest of these competitions is the Chinese Girls' Mathematical Olympiad (CGMO). EGMO is the brainchild of Geoff Smith, the leader of the team from the United Kingdom at IMO, and its first edition was held in Cambridge (the real one, not the one in Massachusetts, and not the homonymous hamlet in Gloucestershire either) in 2012. The second edition was held in Luxembourg in 2013, followed by the third edition in Turkey in 2014. Belarus hosted the 2015 edition, and the 2016 edition that is the object of the present report was held in Romania. The 2017 edition will take place in Switzerland. While no further host countries have been officially announced, several countries have made exciting bids for 2018 and beyond. Ultimately, however and in the words of Ceri Fiddes, competition director at EGMO 2012, EGMO will have been a success when there is no longer any need for it.

The format of EGMO is that of IMO: contestants sit two four-and-a-half-hour papers consisting of three extremely tough mathematical problems on two consecutive days. In a process called coordination, an

¹A caveat applies: the Dutch leader at EGMO and chair of the EGMO advisory board, Birgit van Dalen, has related that, when she participated in mathematical olympiad training camps as a student, boys got crowded into shared dorms, whereas she, being the only female participant, had a room all to herself.

intense communion between the team leaders and deputy leaders on the one hand and experts from the host country on the other, an integer mark out of seven is assigned to each problem. Medals are awarded to approximately half of the contestants; half of the medals are bronze medals, one third are silver, and one sixth are gold medals. Contestants who do not receive a medal, but solve one question completely, are awarded an honourable mention.

The reason why this competition is a European one is more mundane: sending teams all over the world to participate in a mathematical competition is expensive. Nonetheless, it is heartening to see so many non-European countries wishing to send guest teams to EGMO, and it is hoped that, in this way, EGMO will spawn off many daughter competitions in other parts of the world, just as EGMO itself was modelled partly on CGMO.

Leader's Diary

Mathematical competitions are best related to others in the form of a leader's diary of the events that may or may not have occurred during the competition. What distinguishes the present diary from its highly biased counterparts is the lack of desire, on the part of the author, to represent his actions in as favourable a light as possible. Caveat lector.

Sunday, 10th April 2016. Austrian Airlines is the carrier of choice if one seeks to travel to Eastern Europe from Luxembourg, with direct flights via Vienna that do however leave Luxembourg at rather ungodly an hour. Checking in our luggage confirmed the mountainous topography of the EGMO location: the mass of Charles Leytem's suitcase, stuffed with climbing gear, was only just below the 20 kg luggage allowance. Austrian Airlines provides a somewhat distinctive flying experience: as soon as one enters one of their planes, one is acoustically assaulted by the works of Mozart or Strauß and greeted by cabin crew in rather loud red uniforms, presumably to avoid the need for high-visibility vests. During the flight, said cabin crew offer sweet or savoury snacks (by asking “*Süß oder salzig?*”, which is rather reminiscent of the German trick-or-treats chant) and complimentary beverages. Since I have a sweet tooth and strong opinions, I went for the chocolate biscuits and asked for tomato juice, the only acceptable beverage on a plane. The culinary value of that combination is admittedly low. (On a related note, until recently, I held the opinion that one could never overdose on tomato juice. A recent transcontinental flight taught me otherwise.)

In a series of Facebook posts, Geoff Smith (who had arrived at EGMO a couple of days before the official arrivals day) had left instructions that included looking out for people in orange T-shirts at the airport. To our dismay, the volunteers that came to greet us were wearing red T-shirts, and we were told that we would have to wait for an hour and a half before boarding a bus that would take us to Buşteni, a two hours' drive north of Bucharest in the Carpathian mountains. We were shepherded into a small room off the arrivals hall, with plentiful supplies of water bottles and apples. The latter were merely decorative though, since they were made of plastic.

Eventually, we set off to Buşteni, but our journey was soon interrupted when the bus was forced to stop by the honking and erratic driving of the car in front of us, the driver of which was, true to stereotype, wearing an open-necked shirt and over-sized sunglasses (and had blatantly lost the family braincell). This person proceeded to engage in a forceful argument with our bus driver, accusing him of manoeuvring dangerously. For some reason, this upset our guide, who had just been telling us that Romanians were jolly, welcoming folk. Charles Leytem went to the front of the bus, and started taking pictures of the altercation. I enjoyed myself tremendously, the more so since, shortly after we finally set off again, there was an announcement to the effect that we were asked to delete any pictures of that event.

As we were approaching Buşteni, we were handed hotel registration forms. After dropping off the contestants at the students' hotel (a process during which the clutch of our bus emitted several rather worrying sounds)

and being met by the senior guide who informed Charles Leytem that, in light of the avalanche risk and recent rock falls, he would not be able to use the climbing equipment he had carted all the way to Buşteni, we were taken to the leaders' hotel. Having climbed the good many stairs to the reception desk, I confidently handed over the registration form that I had filled in on the bus, but was informed that this would not do. I was then handed a form that was identical to the first one, save for the fact that the new form had the name of the hotel printed at the top. I took a deep breath, and filled in the new form, after which I was given the key to the room which I was to share with Michel Seville, the Belgian leader. In the bathroom, the toilet, washbasin, and shower all bore signs stating, in several languages, that these items had been disinfected. This was reassuring.

After a late lunch, Charles Leytem and I proceeded to vary our z -coordinate (not without some trepidation on my part, given the warnings about bears that Geoff Smith had disseminated via Facebook). Upon returning to the hotel, we were hailed by Geoff Smith, who, with sybilline accuracy, deduced that we had been up in the mountains, and then, after mumbling darkly about business class lounges and black limousines, gave us a tour of the suite of rooms that had been set aside for the use of the chairman of the IMO advisory board.

One of the subtle ways in which the leaders' hotel was more upmarket than the students' hotel was the fact that there was music playing in the dining room at the leaders' hotel. The "greatest hits" of Al Bano Carrisi and Romina Power were particularly prominent on the playlist.

After dinner, the leaders were – in a departure from EGMO tradition – handed the problems chosen by the organisers²:

Day One

Problem 1. Let n be an odd positive integer, and let x_1, x_2, \dots, x_n be non-negative real numbers. Show that

$$\min_{1 \leq i \leq n} \{x_i^2 + x_{i+1}^2\} \leq \max_{1 \leq j \leq n} \{2x_j x_{j+1}\},$$

where $x_{n+1} = x_1$.

Problem 2. Let $ABCD$ be a cyclic quadrilateral, and let diagonals AC and BD intersect at X . Let C_1, D_1 and M be the midpoints of segments CX, DX and CD , respectively. Lines AD_1 and BC_1 intersect at Y , and line MY intersects diagonals AC and BD at different points E and F , respectively. Prove that line XY is tangent to the circle through E, F and X .

Problem 3. Let m be a positive integer. Consider a $4m \times 4m$ array of square unit cells. Two different cells are *related* to each other if they are in either the same row or in the same column. No cell is related to itself. Some cells are coloured blue, such that every cell is related to at least two blue cells. Determine the minimum number of blue cells.

Day Two

Problem 4. Two circles, ω_1 and ω_2 , of equal radius intersect at different points X_1 and X_2 . A circle ω is externally tangent to ω_1 at a point T_1 , and internally tangent to ω_2 at a point T_2 . Prove that lines X_1T_1 and X_2T_2 intersect at a point lying on ω .

Problem 5. Let k and n be integers such that $k \geq 2$ and $k \leq n \leq 2k - 1$. Place rectangular tiles, each of size $1 \times k$ or $k \times 1$, on an $n \times n$ chessboard so that each

²Unlike IMO, where the six problems that make up the contest papers are selected from a shortlist of thirtyish problems by the team leaders, at EGMO, the Problem Selection Committee (PSC) actually sets the papers (with a list of backup problems in case any problem gets rejected on the ground of being already known). All things considered, this year's PSC got the balance of the questions right, but I would like to see a clear system established by which some external control is exerted over the choice of the PSC. *Quis custodiet ipsos custodes?*

tile covers exactly k cells, and no two tiles overlap. Do this until no further tile can be placed in this way. For each such k and n , determine the minimum number of tiles that such an arrangement may contain.

Problem 6. Let S be the set of all positive integers n such that n^4 has a divisor in the range $n^2 + 1, n^2 + 2, \dots, n^2 + 2n$. Prove that there are infinitely many elements of S of each of the forms $7m, 7m + 1, 7m + 2, 7m + 5, 7m + 6$ and no elements of S of the form $7m + 3$ or $7m + 4$, where m is an integer.

We were later told that these problems had been proposed by the Netherlands, Belarus, Mexico, Luxembourg, the Netherlands (again), and the Netherlands (once again!) respectively. My initial feeling, when I saw these problems, was one of dismay, because I was one of the people that problem 4, the brainchild of Charles Leytem, had been tested upon before submitting it to EGMO, and I had not considered this problem easy enough to be in that position on the paper. Problem 1, however, I soon discovered to be amazing, a fun, easy inequality – of course, “easy” is always a relative term in olympiad mathematics, and the vast majority of secondary school students would not be able to score any marks on these “easy” problems. The results of the competition proved my assessment wrong, though: the mean score on the first problem was lower than that on the fourth one, though both means were slightly lower than one would have hoped for.

But what better way could there be of spending the first evening of the olympiad than having a go at the problems. Later in the evening, Michel Seville arrived at the leaders’ hotel: the travel plans of the Belgian team had suffered some upheaval owing to recent events at Brussels airport. These terrorists are really bloody inconsiderate.

Monday, 11th April 2016. With the first official day of the competition came a succession of jury meetings to approve the problems, their wording, and then, eventually, the translations into various languages. The meeting was adjourned briefly for the leaders to attend the opening ceremony, one of the many events at which the mayor of Buşteni, with his sash in the Romanian national colours, was very much present. I understand that this olympiad would not have happened without the support given to the organisers by the town of Buşteni and its mayor: EGMO owes a lot to Buşteni, and the whole EGMO community is of course hugely grateful for this support. There was a large number of – mercifully short – speeches, and some dancing by children from local schools.

It is of course hard to convey the atmosphere of intellectual excitement that dominates these jury meetings and the eloquence of the speeches advocating different choices for the colour required in the statement of problem 3. This system of encouraging collective verbal diarrhoea has withstood the test of time: over the course of several hours, eventually, somebody will point out something important. Accordingly, I did my very best to contribute to this quantity of speeches. *Si tacuisssem...*

Later in the evening, as the translations started piling up, it became apparent that one translation was missing, but so was the corresponding leader. He had dutifully translated the problems before wandering off, but failed to realise that he would have to hand his translation to someone in charge so that his students would receive that translation on the morrow. What remained of the jury plumped for the expedient of arranging for the students of the country in question to be given translations of the paper in all languages of the countries that border the country in question.

Tuesday, 12th April 2016. Leaving Michel Seville to report to reception the flooding caused in our room by the intermittent downpour, I headed across Buşteni to the local school where the contest papers were to be sat. I joined a throng of leaders looking, without success, for the fabled room – a sort of mythical *El Dorado* without the attractions of abounding precious metals – where the jury would gather and whither the

queries that the contestants are allowed to send to the jury during the first half hour of the contest would be ferried (by means, as we learnt later, that were already known to the Greek army at the time of the Battle of Marathon). Accordingly, we enthusiastically greeted the arrival of the chairman of the IMO advisory board – even though his limousine was green rather than black – since we were hoping that he would guide us to see the light (at the ceiling of that room). As a more active measure, we also asked one of the guides for directions; he told us to go into the contest hall. That we knew not to be the correct answer, so, with a tremendous feeling of self-importance, we added that we were the leaders. At this point, the guide replied that we should go back to our hotel, and it became clear to us that he had even less of an idea where we were supposed to be than we did. Geoff Smith told him so, and instructed him to find someone competent.

The question-and-answers session often provides light-hearted relief by highlighting various innovative ways in which one might misunderstand the questions. The leader from Bosnia and Herzegovina had the slightly awkward task of explaining to the jury that one of his students was asking why the paper was typeset using the Latin, rather than Cyrillic alphabet, but opined that this was a joke. After all the queries had been dealt with, the jury proceeded to tear the proposed mark schemes for problems 1 and 3 to pieces. (Geoff Smith, wearing the mantle of problem captain for problem 2, adopted the much more successful strategy of producing a detailed marking scheme and talking through it in such a way as to send the jury to sleep.) Suffice it to say that this went on until the chairman of the jury informed us that we would have to take the final vote lest we miss lunch.

After lunch, I suggested to Lea and Luana that we take a walk up in the mountains, physical exhaustion being the best way of ensuring that they would get a good night's sleep before the second day of the contest, but their guide Teo – a local high school student and a truly outstanding guide to the team – told me that they were not allowed to leave the hotel without him, but that he in turn was not allowed to take them up into the woods without armed police escorting them. (I learnt later that some female leaders – latter-day little red riding hoods in the eyes of the organisers – were prevented from walking back from the students' hotel on their own late at night.) Accordingly, we joined the UK team on a walk across Buşteni to the bottom of the ski slopes, to find out what they would look like without snow. My devious mind realised immediately that, since the slopes were not covered in vegetation tall enough to hide bears or big bad wolves, we could considerably vary our z -coordinate by walking up the ski slopes. Fortunately, the others were far too polite to point out that this was a daft idea, not least because the ground was extremely soggy because of all the rain of the last days. When we finally reached a section of the slope that was sloping gently enough for conversation to be possible, Jo Harbour, the UK leader, told me that she had been recording an olympiad diary that would be broadcast over the radio. She admitted to recording some additional, rather fanciful messages (“The medal boundaries are out, and the UK team has won four gold medals.”), and would have to be careful not to send those in.

When I got back to hotel (after spending some time cleaning my shoes), I was surprised to learn that the students' copies had already arrived: the photocopying of the contestants' mathematical outpourings³, often stretching to a truly amazing number of pages, is usually a lengthy process, but Canon (one of the sponsors of the event) had put a high-throughput photocopier at the organiser's disposal. The less said about the marking however, the better.

Wednesday, 13th April 2016. In the morning, the rain clouds that had been shrouding the valley for the last couple of days had dispersed, and the sun shone on a glorious expanse of mountain tops. Further attempts to vary our respective z -coordinates would be imminent.

³At these mathematical competitions, the leaders are given the originals of their contestants' scripts after they have been photocopied (the scripts, not the contestants). The photocopies are given to the coordinators, and the leaders of the countries that proposed the problems and therefore coordinate the host country's scripts, are often given photocopies of these photocopies, by which time, experience tells me, things have become rather hard to read.

Why did the organisers arrange for both an ambulance⁴ and a car of the fire brigade to be on hand at the contest site? In the end, no contestant spontaneously self-ignited, and the fire brigade was not required, but the ambulance was required: one contestant, who was feeling slightly queasy on the morning of the second contest day and was going to win a silver medal, went into the contest hall, solved two problems, and then left to be taken to hospital, be diagnosed with appendicitis and be operated on. Such devotion to the cause of mathematics is of course to be commended.

After the jury had dealt with the contestants' queries, it disposed of the matter of the marking schemes rather more efficiently than on the first day. (Charles Leytem had produced a marking scheme for Problem 4 that stretched to several pages.) Charles Leytem and I decided to skip lunch and head up into the mountains. After crossing a couple of small expanses of snow that not yet melted away and Charles Leytem had made several unfavourable comments on the quality of my hiking boots, we reached a hut where the path ended, and several climbing routes started. On our way down, we met a local hiker, a member of the mountaineering club of Buşteni who was checking on the state of the various climbing routes after the winter. He asked us where we were hailing from, and whether we had bear spray. This made me feel slightly uneasy, the more so as, when he was exchanging climbing banter with Charles Leytem, he lamented the fact that his climbing partner had suffered a fall, and they had therefore had to cancel a trip to Switzerland to attempt the Eiger north face in winter.

Marking the scripts of the two Romanian teams for Question 4 was somewhat tedious, but my lot was clearly not as bad as the Dutch one, with three Dutch questions on the two papers. (At around midnight, the Lithuanian leader told me that he would be happy if his contestants wrote as much as mine did, so I had to clarify that it was not my own team's efforts that took this long to mark.) One of the Romanian contestants invoked a "well-known" lemma in her solution (with a footnote to the effect that it was easily proved using complex numbers). I had never heard of said lemma; moreover, a quick check using Geogebra revealed the lemma to be false. This, I must say, I found slightly bemusing.

Thursday, 14th April 2016. Coordination at EGMO 2016 turned out to be a very polyglot business: on top of coordinations in English, I had one coordination in French, and one in German, with a *Siebenbürger Sachse*, a member of the German-speaking minority in Transylvania; their ancestors emigrated from parts of the then Holy Roman Empire close to Luxembourg. The dialect still spoken by some *Siebenbürger Sachsen* (who thus have nothing to do with Saxony) is quite close indeed to Luxembourgish. The discussions were very relaxed and friendly, although there was a slight misunderstanding when the coordinators thought I was haggling for more marks, but I was actually pointing out that I could not accept the mark they were offering, because the argument they were trying to award a mark for was flawed. The final tally for the Luxembourg team was as follows:

		P1	P2	P3	P4	P5	P6	
LUX1	Luana Capus	0	0	1	0	1	0	2
LUX2	Lea Menasce	0	0	0	1	0	0	1

Well, there is always next year: both Luana and Lea are eligible to participate in at least one more EGMO, and are determined to do better next time round.

Since I had finished coordination before lunch, I was able to attend the set of lectures, sponsored by Google, organised for the contestants in the afternoon: two female Romanian mathematicians delivered a semi-popular lecture on their research. The prefix "semi" was certainly appropriate, and I am not sure many contestants got much out of the lectures. Some people were anyway clearly more interested in the latest updates of the online scoreboard.

⁴At my first IMO as a contestant, 2007 in Vietnam, on our excursions, we had a police car leading, with flashing blues and twos, our convoy of buses, with an ambulance at the back providing the rear guard. Given the erratic driving of both the other drivers and that of our bus drivers, the presence of the ambulance was entirely understandable.

Given the tediousness of some of the earlier jury meetings, I did not look forward to the final jury meeting in the evening, where the medal boundaries would be fixed. In fact, the organisers did exactly the right thing, and the boundaries, 11 for bronze, 17 for silver, and 27 for gold, were decided on in a jiffy. There was a minute of silence for Dan Schwarz, a stalwart of the mathematical olympiad community who had died last year. A slightly awkward pause ensued when an appropriate noun to describe the deceased was sought – “friend” was decided upon eventually.

Later in the evening, I played a card game, *Tichu*, with the Viviane and Jonas (the Swiss leader and observer), and Dan, the Israeli leader (not without some trepidation, given the humiliating defeat I had suffered last year when playing *Avalon*, a game about which I ignore everything apart from the name). *Tichu* is a game for four players, where one teams up with the person one is sitting opposite to, and then discards cards according to certain rules. That of course would not on its own make a game interesting enough for a bunch of mathematicians: additionally, one can win bonus points by making bets on who will be the first person to discard all the cards in their hand. In fact, I need not have worried: Viviane and I got such ridiculously good cards that, not matter how cleverly Jonas and Dan played, their efforts were doomed.

Friday, 15th April 2016. The first stop on the EGMO excursion was Peleş castle, a Neo-Renaissance abode constructed by King Carol I. of Romania, a Hohenzollern–Sigmaringen imported when the previous king (or *domnitor*) was overthrown. The leaders’ bus arrived somewhat early, so Joseph Myers had ample opportunity to describe his first aid knowledge. For some reason, this mainly consisted of procedures to follow to make sure that drunk people do not choke on their vomit. I knew that Britain has a problem with underage binge drinking, but still... Meanwhile, Charles Leytem and Azer Kerimov, the Turkish leader, tried to remember whether Peleş castle had featured on the leaders’ excursion at IMO 1999.

After visiting the ground floor of the castle and taking a group picture in its gardens (squeezing through a hedge having ensured us, the Luxembourg team, an appropriately central position in the picture), the logical next step would have been to visit the first floor of the castle. Instead, we were taken by bus to what used to be a casino and is now a collection of empty, if rather nice, rooms, before being shepherded to the shop in the basement of building, presumably so that we could purchase paintings if we so wished (needless to add, we did not). Some of these were nudes, presumably an attempt to distract from their artistic shortcomings, so some contestants, hailing from countries where this kind of thing is unacceptable, were ushered out of the room by their chaperones.

For the closing ceremony, the city hall of Buşteni had been lavishly decorated with roses in the national colours of Romania (dyed ones for the blue colour). There was a slightly awkward moment when medal winners from Czechoslovakia were announced. (Coincidentally, a couple of days after the closing ceremony, the Prime Minister of the Czech Republic gave a press conference to voice his wish that his country be referred to as “Czechia” in English media.) The Minister of Education arrived just in time to hand out the gold medals, and the Russian contestant who won the competition with a perfect score was handed a voucher for a week’s holiday in Buşteni with her family by the ubiquitous mayor of the town. And yes, there were speeches, and the Swiss team showed a rather fancy video inviting us to next year’s competition in Zurich. EGMO has certainly come a long way since its humble beginnings in Cambridge and Luxembourg.

After the ceremony, we took some pictures outside the city hall; unfortunately, the inane smile adopted by the team leader makes the photographs of the Luxembourg team unsuitable for publication. We then wandered across Buşteni to the students’ hotel, where the farewell dinner and party were to take place. Since the dining room could not seat everyone, we had been told that a special room had been set aside for the leaders and other dignitaries. It quickly transpired that live entertainment was the feature that made our room special, so, harking back to the acoustic assault that we had been subjected to during the farewell party at EGMO 2014, I made sure to be separated from the band by a dividing wall in the room.

Jugs containing a clear liquid had been placed on our tables. The liquid in question was not water however, but a rather potent local spirit. This prompted the US leader to rush to the main dining hall to make sure that her team were not exposed to the beverage in question (in fact, she need not have worried: spirits and wines had been placed on the slightly less special tables set aside for the deputy leaders in the main dining room). Nonetheless, this beverage clearly contributed to a certain *bonhomie* that started to pervade the special dining room, to such an extent that, after the main course had been eaten, a new voice started singing: it turned out to be the mayor, who, judging by the possibly sycophantic laughter of his subordinates, was belting out burlesque songs. Fortunately, this exhibition was interrupted when we had to adjourn to the main dining hall for the cutting of the rather spectacular EGMO cake offered by the mayor. (For some strange reason, the DJ played “Happy Birthday” while the cake was being cut). It was a triple-layered chocolate mousse cake, of which I devoured three slices; predictably, this made me feel sick.

There was dancing as well. I hid my lack of prowess in that discipline by exaggerated movements, both in the horizontal and vertical directions. Some atavistic chivalry made me stay until Lea and Luana retired for the night; fortunately, they did not stay till the end of the party, since I started feeling rather old when the DJ played “*Dragostea din te*” and I realised that most contestants had been not much more than toddlers when that song was released in 2004.

Saturday, 16th April 2016. Once again, glorious sunshine greeted us on our last morning in Bușteni, as we boarded the buses that were to take us to the airport. At the airport, the Belgian team started a game of “ninja”, which involves jumping about while trying to touch other people’s arms (thus not being so very different from my dance moves the night before). We were not the only people from Luxembourg at the airport, and two shady compatriots tried to strike up a conversation with us. While I merely dismissed them as not being the sharpest knives in the drawer, Charles Leytem put quite sinister an interpretation upon their designs in a later conversation.

As our plane took off from Bucharest airport towards the north, we caught a glimpse of the snow-covered mountain tops of the Carpathian mountains, and even of the Heroes’ Cross that sits on top of Caraiman, the peak that dominates Bușteni (a piece of local trivia in the Olympiad brochure that had been copy-pasted from Wikipedia without even the hyperlinks being removed). Lea asked me whether it was true that the brace position is designed so that one’s neck snaps when a plane makes a crash landing. I felt I was not qualified to answer that question and mumbled something reassuring.

Our flight from Vienna to Luxembourg was delayed, but we eventually made it to our destination, where we parted ways, and another EGMO journey thus came to its close.

I am left to thank the organisers of EGMO 2016 and all those who, notwithstanding those minor hiccups that I have highlighted or made up for comic effect, contributed to making the olympiad such a terrific success.

Cambridge, 19th July 2016.