



INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)

INITIATIVE ON FORENSIC GEOLOGY (IFG)

ANNUAL REPORT FOR 2015

DR LAURANCE DONNELLY, CHAIR IUGS-IFG



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**INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)
INITIATIVE ON FORENSIC GEOLOGY (IFG)**

Annual Report 2015

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**INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)
INITIATIVE ON FORENSIC GEOLOGY (IFG)
ANNUAL REPORT FOR 2015**

1 TITLE OF CONSTITUENT BODY

The International Union of Geological Sciences (IUGS), Initiative on Forensic Geology (IFG) was officially launched during the 62nd Executive Committee Meeting of the IUGS, which was held at UNESCO headquarters, in Paris, France, on 22nd February 2011.

2 AIM

2.1 Mission Statement

IUGS-IFG seeks to; *'to develop forensic geology internationally and promote its applications'*.

2.2 Objectives

The objectives of the IUGS-IFG are to:

1. Collate and disseminate data and information on forensic geology applied to policing and law enforcement, criminal, environmental and civil investigations;
2. Promote international meetings, seminars, conferences and training;
3. Develop a 'Committee' to act as principal advisers, collaborators and active participants;
4. Develop an international network whereby each 'member' will act as a principal contact in their respective country for the collation and dissemination of information on forensic geology;
5. Collate, make available and where appropriate review any existing documentation and publications in forensic geology; and
6. Produce a document endorsed by the Committee to be called; *'A Guide to Forensic Geology'*.

3 ROLE WITHIN IUGS SCIENCE POLICY

3.1 Background

Although the documented history of forensic geology can be traced to the latter half of the 19th Century, in recent years there have been significant interests and developments in the multidisciplinary fields of forensic geology throughout the world. Since the millennium there have been numerous international meetings, conferences, seminars and training on different aspects of forensic geology. Furthermore, several text books have been published and there are numerous technical papers in peer reviewed scientific journals, conference proceedings, magazines, police and law enforcement literature. IFG represents IUGS interests in forensic geology and provides the opportunities for capacity building, knowledge transfer and outreach events, promoting our mission, *'to develop forensic geology internationally and promote its applications'*. The members of the IFG committee are senior representatives of their respected organisations and include geologists, geoscientists, police officers, forensic scientists and law enforcement agencies.

3.2 Main Approach

IUGS-IFG aims to raise the global awareness of forensic geology by holding meetings and conferences, promoting research, teaching, training and the operational deployment of forensic geologists. This will be consistent with the broad objectives of IUGS, and includes the following:

- **Capacity building:** By raising levels of awareness, knowledge and providing information about forensic geology;
- **Technology transfer:** Through improvement in skill sets; and
- **Outreach:** Educating and informing police, law enforcement organisations, geologists, geoscientists and the 'general public' about forensic geology.

4 ORGANIZATION

The IUGS-IFG Committee comprises representatives from major geographical regions of the world and includes specialists from academia, industry, consultancy, operationally based forensic geologists, the police, law enforcement agencies and forensic organisations, as shown in Figure 4.1 and Table 4.1.

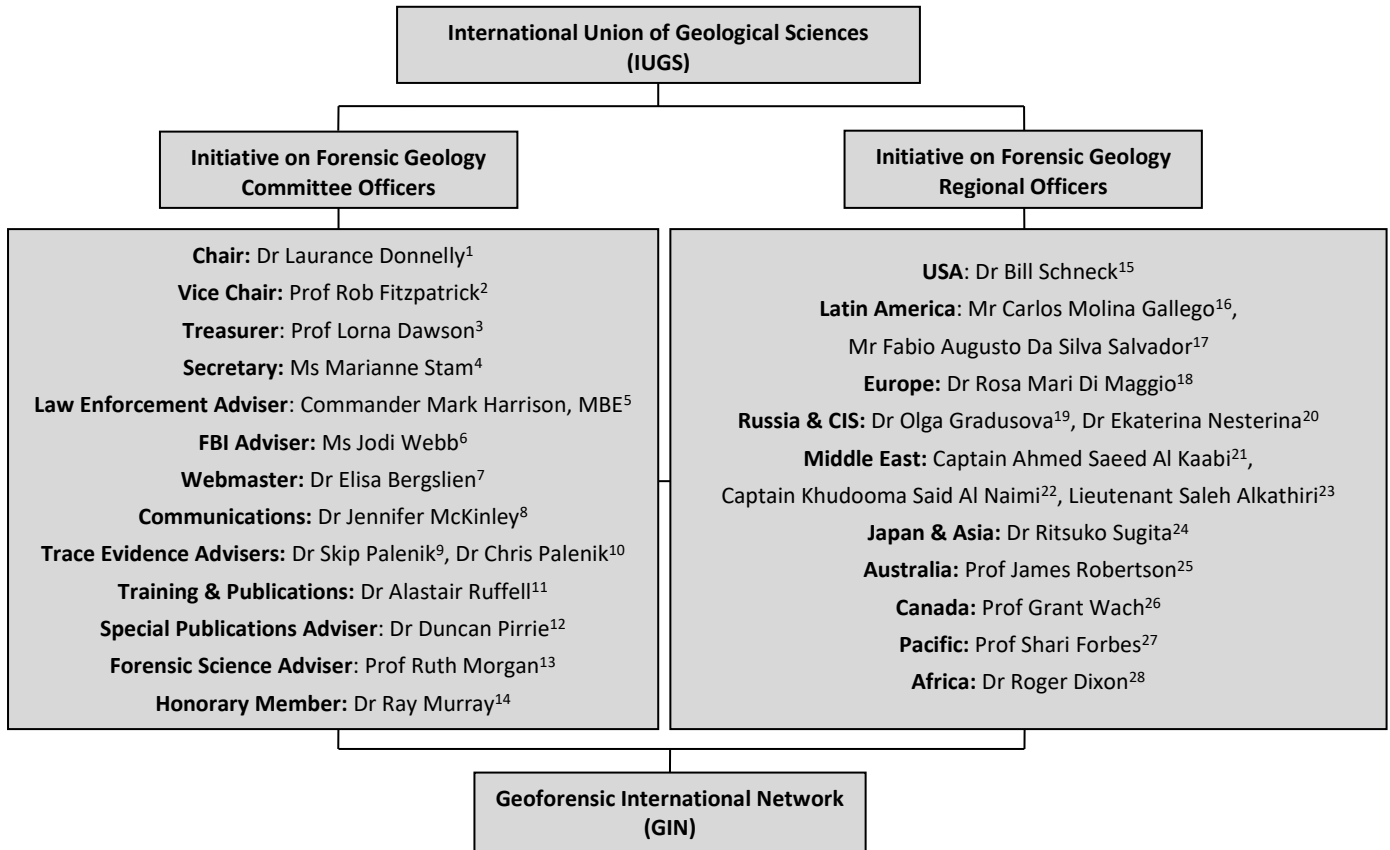


Figure 4.1 Structure of the IUGS-IFG Committee in 2015

4.1 IFG Committee Changes

In 2015, three new members were assigned to the IUGS-IFG Committee as follows:

- Dr Duncan Pirrie, Special Publications Adviser;
- Dr Ruth Morgan, Forensic Science Adviser; and
- Mr Fabio Augusto Da Silva Salvador, joint Co-officer for Latin America.

In 2016, the IUGS-IFG committee aim to consider adding two serving police officers from the Abu Dhabi Police, Forensic Geology Group, to facilitate and assist with the establishment of a Forensic Geology training event, in Abu Dhabi, in 2017.

| POSITION | NAME | COUNTRY | AFFILIATION |
|--------------------------------------|--|--------------------|--|
| Chair | ¹ Dr Laurance Donnelly | England | IUGS-IFG |
| Vice Chair | ² Prof Rob Fitzpatrick | Australia | Commonwealth Scientific and Industrial Research Organisation (CSIRO) |
| Treasurer | ³ Prof Lorna Dawson | Scotland | The James Hutton Institute |
| Secretary | ⁴ Ms Marianne Stam | USA | California Department of Justice |
| Geoforensic Law Enforcement Adviser | ⁵ Commander Mark Harrison, MBE | Australia | Australia Federal Police (AFP) (formerly, UK Police National Search Adviser) |
| FBI Adviser | ⁶ Ms Jodi Webb | USA | Federal Bureau of Investigation (FBI) |
| Webmaster/Information Officer | ⁷ Dr Elisa Bergslien | USA | SUNY Buffalo State |
| Communications | ⁸ Dr Jennifer McKinley | N. Ireland | Queens University Belfast (QUB) |
| Geological (Trace) Evidence Advisers | ⁹ Dr Skip Palenik ¹⁰ Dr Chris Palenik | USA | Microtrace LLC |
| Training and Publications | ¹¹ Dr Alastair Ruffell | N. Ireland | Queens University Belfast |
| Special Publications Adviser | ¹² Dr Duncan Pirrie | England | Helford Geoscience LLP |
| Forensic Science Adviser | ¹³ Prof Ruth Morgan | England | University College London, JDI Centre for the Forensic Sciences |
| Honorary Committee Member | ¹⁴ Dr Raymond Murray | USA | Forensic Geologist, Montana |
| Officer, USA | ¹⁵ Dr Bill Schneck | USA | Washington State Patrol Crime Laboratory |
| Officer, Latin America | ¹⁶ Mr Carlos Molina Gallego ¹⁷ Mr Fabio Augusto Da Silva Salvador | Colombia Brazil | Instituto Nacional de Medicina Legal y Ciencias Forense, Bogota Brazilian Federal Police (BFP) |
| Officer, Europe | ¹⁸ Ms Rosa Maria Di Maggio | Italy | Geoscienze Forensi Italia (formerly, Servizio Polizia Scientifica) |
| Officer, Russia & CIS | ¹⁹ Dr Olga Gradusva ²⁰ Dr Ekaterina Nesterina | Russia | Russian Federal Centre of Forensic Science, Ministry of Justice, Moscow |
| Officer, Middle East | ²¹ Captain Ahmed Saeed Al Kaabi ²² Captain Khudooma Said Al Naimi ²³ Lieutenant Saleh Ali Al Katheeri | UAE | Abu Dhabi Police, Forensic Geology Group, United Arab Emirates Abu Dhabi Police, Forensic Geology Group, United Arab Emirates Abu Dhabi Police, Forensic Geology Group, United Arab Emirates |
| Officer, Japan and Asia | ²⁴ Dr Ritsuko Sugita | Japan | National Research Institute of Police Science, Japan |
| Officer, Australia | ²⁵ Prof James Robertson | Australia | University of Canberra |
| Officer, Pacific | ²⁶ Prof Shari Forbes | Australia | University of Technology, Sydney |
| Officer, Canada | ²⁷ Prof Grant Wach | Canada | Dalhousie University, Nova Scotia |
| Officer, Africa | ²⁸ Dr Roger Dixon | South Africa | University of Pretoria (formerly, Forensic Science Lab, South African Police Service) |

Note: The superscript number assigned to each member of the IUGS-IFG Committee, refers to those involved in the events and activities during 2015, as summarised in section 7 of this report

Table 4.1 IUGS-IFG committee members in 2015 and their professional affiliations

5 EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

During 2015 support for IUGS-IFG was provided by individual committee members and their respective employers/organisations. The in-kind value of this support is considerable. IUGS-IFG has estimated that the Committee Officers have provided at least **194 person days** in the last year attending IUGS-IFG conferences and providing training courses, the provision of outreach events and the management of the Initiative. The value of this in-kind support is difficult to quantify, however a commercial value to the time spent on the IUGS-IFG in 2015 would be in excess of approximately **USD(\$155,000)**. In addition, participation in the various IUGS-IFG events during the year has also been supported directly by committee members employers and via research funding of approximately **USD(\$54,500)**. We therefore estimate the value of this indirect funding and in kind funding support to be in excess of approximately **USD(\$210,000)**.

5.1 Acknowledgements

Throughout 2015, IUGS-IFG received support from numerous organisations, which include the following:

- **IUGS Executive Committee.**
- **Prof Peter Bobrowsky, Prof Colin Simpson, Dr Brian Marker MBE, Dr Kevin Telmer**
- **Commercial companies:** Helford Geoscience LLP (UK), Microtrace LLC (USA), James Hutton Limited and Geoscienze Forensi Italia (Italy)
- **Police, Law Enforcement and Federal Agencies:** California Department of Justice, Federal Bureau of Investigation (USA), Australian Federal Police (Australia), Washington State Patrol Crime Lab (USA), Abu Dhabi Police (UAE), Russian Federal Centre of Forensic Science (RFCFS) of the Ministry of Justice of Russia (Russia), National Research Institute of Police Science of Japan (Japan), Servizio Polizia Scientifica (Italy), Carabinieri (Italy), Brazilian Federal Police (Brazil), National Crime Agency (NCA) (UK), Police National Search Centre, The College of Policing (UK), Home Office Centre for Applied and Scientific Research (CAST) (UK), Greater Manchester Police (GMP) (UK), West Yorkshire Police (UK), South Yorkshire Police (UK), Police Scotland, Inspector Graham Peffers (GMP and NCA), Inspector Colin Hope (NCA) Mike Ferguson (CAST), Inspector Jon Feather (UK).
- **Universities and Research Institutes:** University of Messina (Sicily), The American University of Rome (Italy), Institute of Forensic Science in China, University of Pretoria (South Africa), Dalhousie University (Canada), National Research Institute of Police Science (Japan), CSIRO (Australia), Centre for Australian Forensic Soil Science (CAFSS) (Australia), Buffalo State College (USA), Queens University Belfast (Northern Ireland), the James Hutton Institute (Scotland, UK), University of Canberra (Australia), University of Technology, Sydney (Australia), University of Keele Department of Earth Sciences (UK), University College London (UK), University of Staffordshire, (UK), University of Pretoria (South Africa), Nacional Institute of Criminalistics (INC) (Brazil), Instituto Nacional de Medicina Legal y Ciencias Forense (Colombia), The Geological Society of London (Forensic Geosciences Group, Near Surface Geophysics Group, Western Regional Group, North West Regional Group), University College London, JDI Centre for the Forensic Sciences.

6 INTERACTION WITH OTHER INTERNATIONAL PROJECTS & ORGANISATIONS

Throughout 2015, IUGS-IFG interacted and collaborated with the organisations and projects listed in Table 6.1.

| ORGANISATION | TYPE OF INTERACTION | PROJECT |
|--|--|--|
| IUGS Executive Committee | Committee meeting | IUGS Executive Committee meeting, Vancouver |
| The Institution of Civil Engineers (ICE), Wales and Chartered Institution of Water and Environmental Management (CIWEM) | Outreach | Annual dinner and guest speaker |
| Geological Society of London, British Geological Survey, Northern Ireland Science Festival, Ulster Museum in Belfast | Outreach | The Year of Mud. 'How Volcanoes Solve Crime?' |
| GB Police Force 1 | Operational support | Search for a shallow, unmarked, homicide grave |
| GB Police Force 2 | Operational support | Search for a missing person |
| GB Police Force 3 | Operational support | Search for a missing person |
| GB Police Force 4 | Operational support | Rape case in Northern Europe |
| GB Police Force 5 | Operational support | Search for missing person in a lake |
| GB Police Force 6 | Operational support | Double homicide search for graves |
| Tellus and Tellus Border Project | Knowledge transfer | Spatially referenced, baseline geochemical data for soils |
| North West Police Underwater Search and Marine Unit, and Centre for Advanced Science and Technology (CAST) | Knowledge transfer and outreach | Imaging and search in underwater environments and the development of search strategies. |
| China Institute of Forensic Science | Outreach | Affiliation with IUGS-IFG & GIN |
| Gendarmerie National Facility, Paris, France | Outreach and knowledge transfer | Conference |
| 7th European Academy of Forensic Science, Prague, Czech Republic | Outreach | Conference |
| Wildlife Crime Scene and Field Investigation Seminar | Outreach | Conference |
| Hertfordshire Geological Society | Outreach | Invited speaker |
| Colombia's National Institute of Medical, Legal and Forensic Sciences. | Knowledge transfer and operational support | PhD research |
| Australian Facility for Taphonomic Experimental Research (AFTER) | Knowledge transfer | Research facility |
| Polizia di Stato, Carabinieri, Geoscienze Forense Italia, Alfatest, Malvern, the James Hutton Institute, Queens University Belfast, Ambregeo, Consiglio Nazionale Dei Geologi and the Geological Society of London, Forensic Geoscience Group, The American University of Rome | Training | MSc in Forensic Geology, University of Messina, Sicily. |
| International Association of Mathematical Geoscience (IAMG) | Outreach and knowledge transfer | Compositional Data (CoDA) Analysis in Forensic Science, in Girona, Spain. Also, the 17th annual IAMG conference, in Freiberg, Germany. |

| | | |
|---|---------------------------------|---|
| Colombian Observatory on Medical and Forensic Geology, and IUGS Geoscience Professionalism and Geoethics. | Outreach | Planning for the 35 th International Geological Congress, in UK, Australia Cape Town, 2016 |
| National Research Institute of Police Science in Japan, Japan Coast Guard Academy, Research Institute of Environmental Geology of Chiba Prefecture, Kagoshima University, and Oxford Instruments. | Outreach and knowledge transfer | International Symposium on the Development of Forensic Geology, 122nd Annual Meeting of the Geological Society of Japan |
| Tellus' and 'TellusBorder' | Knowledge transfer | Northern Ireland |
| Geology and Environment for Manchester Students (GEMS) | Outreach | Guest speaker |
| Animal, Soil, Plant Trace (ASPT) working group of the ENFSI network | Training | Belgium |
| EMFA a joint venture between the Forensic Science Institute of the French Gendarmerie (IRCGN) and the ENFSI project group Forensic Archaeology. | Outreach and knowledge transfer | France |
| Hong Kong Regional Group of the Geological Society and Geological Society of London | Outreach | Hong Kong |
| University of Dundee, Scotland | On line course | Massive On line Open Learning (MOOC) |
| 3rd International Conference on Engineering Geophysics, Al Ain, UAE | Conference | United Arab Emirates University, Al Ain, UAE and Society for Exploration Geophysicists (SEG) |
| Abu Dhabi Police, Forensic Geology Group | Training | Planning for land and water search training in 2017 |
| Police National Search Centre, The College of Policing, UK | Training | Police Search Advisor (PoISA), CPD course |

Table 6.1 Selected examples of IUGS-IFG collaboration in 2015

7 CHIEF ACCOMPLISHMENTS

7.1 JANUARY

7.1.1 68th IUGS Executive Committee Meeting, Vancouver, Canada^{1,27}

On 27th January 2015, IUGS-IFG attended the 68th IUGS Executive Committee meeting in Vancouver and provided an overview of IUGS-IFG activities throughout 2014. The global advancement of forensic geology was acknowledged and positive feedback was provided the Secretary General of IUGS.

7.1.2 Search for a Grave, Northern Europe¹

A covert search for the grave of a child who went missing several years ago continued throughout 2015, in a remote part of Northern Europe. This included the use of geophysical surveys, Red-Amber-Green (RAG) prioritisation maps, Conceptual Geological Models (CGM), interpretation of historical and recent aerial imagery, behavioural profiling of the offender, victimology assessments, geological review of intelligence, the development of soil sampling and Volatile Organic Compound (VOC) analysis. This search will continue into 2016 and beyond or until the target is found.

7.2 FEBRUARY

7.2.1 The Royal Society, London, England^{3,8,11}

On 2nd to 3rd February 2015, IUGS-IFG attended, *'The Paradigm Shift in Forensic Science'*, which was held at The Royal Society, in London. IUGS-IFG also attended part of a follow on meeting at Chichley Hall, in London, with a group of lawyers, judges and forensic scientists.

7.2.2 Forensic Geology at the ICE & CIWEM Annual Dinner, Cardiff, Wales¹

On 5th February 2015, IUGS-IFG was invited as guest speaker at the Annual Dinner of the Institution of Civil Engineers (ICE) and Chartered Institution of Water and Environmental Management (CIWEM), at the Trevithick Lecture Theatre, Cardiff School of Engineering, in Cardiff, South Wales. The presentation given was entitled, *'Forensic Geology: The Applications of Geology to Policing and Law Enforcement'*. The event was attended by civil and structural engineers, geologists and students. There was particular interest in the applications of forensic geology to civil engineering failures and geohazards.

7.2.3 Forensic Science Seminar, University College London (UCL), London, England^{1,13}

On 5th February 2015, a representative for the UK Home Office, Centre for Advanced Science and Technology (CAST) gave a presentation at UCL, in London. This presentation included the applications of geophysics to assist with ground and water searches.

7.2.4 The Year of Mud, How Volcanoes Solve Crime, Belfast, Northern Ireland^{8,11}

On 19th February 2015, IUGS-IFG took part in the Geological Society of London themed event, *'The Year of Mud'*. Two sessions were held entitled, *'How can Volcanoes Help Solve Crime?'* The venue was the Ulster Museum in Belfast. This attracted 75 attendees with 75% of being under the age of 15, who participated in soil examination and footwear treads.

7.2.5 Tellus Soil and Sediment Geochemistry, Belfast, Northern Ireland^{8,11}

The 'Tellus' and 'TellusBorder' projects includes data on soil and stream sediment properties that are spatially-referenced for Northern Ireland. This potentially provides invaluable intelligence when used in conjunction with information relating to the context of a particular crime to determine the provenance of a displaced sample. Such material may be have adhered to a suspect's footwear, clothing, vehicle, weapon or contraband. A case study used a spade to allegedly excavate an area for the concealment of a mortar and mortar rounds.

7.3 MARCH

7.3.1 Operational Support, Rape Case, Northern Europe¹

In March 2015, information was provided on the geology of a rock sample used during the brutal rape of a woman to assist with identifying the type, source and location of the rock.

7.3.2 Northern Ireland Science Festival, Belfast, Northern Ireland^{1,8,11}

A Forensic Geology session was held at the Northern Ireland Science Festival. This event was organised by the Ulster Museum in collaboration with Queen's University Belfast (QUB), Geological Survey Northern Ireland (GSNI), Northern Ireland Regional Group of the Geological Society of London. This included an overview of, '*What is forensic geology and how has geology helped to solve several high profile criminal cases in the UK and internationally?*' For example, how can soil found on a shoe help to solve a crime? The story of an ancient volcanic landscape is revealed and how volcanoes can help to solve crime. A series of interactive talks followed by a treasure hunt for forensic geological clues using exhibition material in the Ulster Museum, which revealed how a forensic geologist thinks and show how an understanding of geological processes and environments can assist in unravelling the crime. This formed part of a Northern Ireland Science Festival, the first of its kind in Northern Ireland and attracted thousands of people to an amazing diversity of science events across the country.

7.3.3 Search for Missing British Person, Europe^{1,3}

IUGS-IFG assisted the Police during the search for a missing British person in Europe.

7.4 APRIL

7.4.1 Deployment of GPR to search for a Missing Person's Grave, Northern Europe^{1,11}

Ground Penetrating Radar (GPR) surveys were deployed across control sites in connection with the search for a missing person's grave in Northern Europe and. The preliminary results were conclusive in detecting the buried control items, which were undetected by GPR at the time of their initial burial. The change in the physical properties of the reinstated peaty soils over a period of approximately 8 years was envisaged to be significant for the deployment of GPR in the geological conditions encountered. The results were subsequently presented in France and Japan in August and September 2015, respectively.

7.4.2 Search for Missing Persons, Colombia, South America⁶

In 2009, IUGS-IFG committee members (1,11,14,15,16) delivered the, '*First IberoLatin American Conference on Forensic Geology, in Bogota, Colombia.*' This was carried out in collaboration with the; National University of Colombia, Department of Geology; Colombia's National Institute of Medical, Legal and Forensic Sciences; Instituto Nacional De Medicina y Ciencias Forense (National Forensic Crime Laboratories) and the Federal Police. Since this course, IUGS-IFG has continued to support the development of forensic geology in Colombia and throughout Latin America. In April 2015, an interview was given to the media on the applications of geology during searches for missing persons in Colombia. The number of people in Colombia who are missing is 85,000 (according to the National Register of Missing People, although some in Colombia suggest this figure is around 96,000). Of these, a significant proportion are estimated to be involuntary disappearances (c19,000 in 2014). As part of PhD research and operation support to the Authorities, geological methodologies and search strategies developed by IUGS-IFG and others are applied during the search for missing person's graves. Further details can be found at <http://www.vice.com/read/the-grave-hunter-0000622-v22n4>

7.4.3 Police and Forensic Water Searches, Northern Europe^{1,11}

In collaboration with the UK Home Office, Centre for Advanced Science and Technology (CAST) and the a UK Police Underwater Search and Marine Unit, IUGS-IFG arranged for the experimental deployment of sonar and water penetrating radar searches of a canal in Europe. The experimental techniques worked well and were able to locate items in the canal.

7.4.4 European Network of Forensic Science Institute (ENFSI), Riga, Latvia^{3,19}

The 4th ENFSI annual meeting was held on 16th to 17th April 2015, at Riga, in Latvia. There were three sessions on, 'Wildlife and Non-human DNA', 'Soil' and 'Morphology'. In addition, there was a 'bring an unsolved case to the group' session, which was useful for sharing innovative ideas and best practice.

7.4.5 Geology and Environment for Manchester Students, (GEMS), Manchester, England¹

On 20th April 2015, a presentation was given to GEMS entitled, 'Forensic Geology: The Applications of Geology to Policing and Law Enforcement.' The event was held in the Williamson Building, University of Manchester, Department of Geology. There was particular interest and discussions on the applications of geology to environmental crimes.

7.4.6 Forensic Geology, Hyperbad, India¹³

In Hyperbad, India, a series of presentations were given to outline the applications of forensic geology and forensic science to police and criminal investigations.

7.5 MAY

7.5.1 Wildlife Crime Scene and Field Investigation Seminar, Montana, USA^{1,4}

On 13th May 2015, a program was developed and presented, which attracted wildlife enforcement officers from around the world. A presentation lasting two hours was given on; 'Forensic Geology and its Application in Wildlife Investigations.'

7.5.2 ASPT, ENFSI, Training in Soil Forensic Microscopy Techniques, Namur, Belgium^{3,9,19}

On 22nd to 27th May 2015, a week long training course was delivered in Namur, Belgium. This was organised from the Animal, Soil and Plant Trace (ASPT) working group of the ENFSI network. The course included pollen and mineral extraction and characterisation, focussing on microscopy when samples are minute in size. A range of participants from across Europe attended and enjoyed a very well run course.

7.6 JUNE

7.6.1 MSc in Forensic Geology, Messina, Sicily, Italy^{1,3,8,11,18}

In 2014-2015, IUGS-IGS supported the Università degli Studi di Messina, Dipartimento di Scienze dell'Ambiente, Messina, Sicily to establish a new MSc course in forensic geology, the first of its kind in Italy. The first part of the course took place in June 2015, followed by a second stage in September 2015. The course was attended by approximately 150 delegates and it was supported in collaboration with the Polizia di Stato, Carabinieri, Geoscienze Forense Italia, The American University in Rome, Alfatest, Malvern, the James Hutton Institute, Queens University Belfast, Ambregeo, Consiglio Nazionale Dei Geologi and the Geological Society of London, Forensic Geoscience Group. The course was heavily publicised and gained much media attention, including national TV coverage through Italy and Sicily. The course contents included a series of formal lectures followed by knowledge transfer events and field training in the following:

- Background, history and global developments of forensic geology;
- Design and implementation of ground searches for buried and concealed items including graves, human remains, drugs, explosives and firearms;
- Crime scene examinations;
- Soil sampling and laboratory analysis;
- Working with the police and law enforcement; and
- Selected operation cases from around the world.

7.6.2 Compositional Data Analysis in Forensic Science, L'Escala, Girona, Spain⁸

IUGS-IFG has links with the International Association of Mathematical Geoscience (IAMG). This included a representation at an event on 1st to 5th June 2015, to discuss on Compositional Data (CoDA) Analysis in forensic science, which was held at L'Escala, in Girona, Spain.

7.7 JULY

7.7.1 Search for a Suspected Missing Person, Northern Europe^{1,3,11}

IUGS-IFG assisted Police in a search for a missing person in Northern Europe. This included the provision of a search strategy and the deployment of geophysical search assets at a remote location over a wide area.

7.7.2 3rd IberoLatin American Course on Forensic Geology, Argentina^{1,16,17}

IUGS-IFG committee plans to be involved with the organisation and planning for the 3rd IberoLatin American Course on Forensic Geology. IUGS-IFG committee members were involved in the management of the 1st course (in Bogota, Colombia, 2009) the 2nd course (in Brazil, 2013). The 3rd course was originally proposed to take place in Argentina in 2016, but this was changed to 2017, to avoid possible clashes with the 35th IGC, to be held in Cape Town in 2016.

7.8 AUGUST

7.8.1 European Meeting on Forensic Archaeology, Pontoise, France^{3,11}

The 4th European Meeting on Forensic Archaeology (EMFA) was held on 28th to 29th August, in Pontoise, France. EMFA is a joint venture between the Forensic Science Institute of the French Gendarmerie (IRCGN) and the ENFSI project group on Forensic Archaeology. The theme of the conference was, *'Crime Scene: Role of the Forensic Archaeologist in a Multidisciplinary Team'* and has a stated purpose of discussing the present and future state of forensic archaeology in European countries, to present relevant case studies, research and development. IUGS-IFG was represented at this event to discuss the applications of forensic geology and collaboration with forensic archaeologists.

7.8.2 Search for Missing Person in a Lake, Northern Europe^{1,11}

IUGS-IFG assisted the Police with a search for a missing person in a lake in Northern Europe.

7.8.3 Crime Writers Festival, Harrogate, England³

IUGS-IFG was represented at the Harrogate Crime Writers Festival. Forensic geoscientists are features in the new books, *'The Moth Catcher'* and *'Time of Death'*.

7.8.4 Crime, Fact or Fiction, Royal Society Summer Science Exhibition, London, UK³

IUGS-IFG and others attended a Royal Society panel debate on, *'Crime Fact or Fiction'*, in London, as part of the Royal Society Summer Science Exhibition. All tickets were sold and over 200 attended.

7.8.5 Crime Novel, London, UK¹

IUGS-IFG was contacted to provide advice and guidance to a crime writer on geological accuracy for a possible crime novel.

7.9 SEPTEMBER

7.9.1 Location of Graves Using Victim Detector Dogs, Europe^{1,5,11}

IUGS-IFG provided a former British police dog handler and FBI canine trainer, with advice aimed at better understanding the influence of geology during the deployment of victim detector dogs to locate homicide graves and to explain the generation of false-positive indications.

7.9.2 The Development of Forensic Geology, Nagano, Japan^{1,8,11,14,24}

Throughout 2014 and 2015, IUGS-IFG planned and organised a forensic geology event in Japan. This was held on 9th to 13th September, at the International Symposium on the Development of Forensic Geology, 122nd Annual Meeting of the Geological Society of Japan, at Nagano, in Japan, in collaboration with the Japan National Research Institute of Police. This symposium was the first of its kind in Japan and focussed on the application of geology and its applications to criminal investigations in Japan. It was attended by the Japan Coast Guard Academy, Research Institute of Environmental Geology of Chiba Prefecture, Kagoshima University and Oxford Instruments. The program was a great success and it included four IUGS-IFG committee members in attendance and

others who assisted with the management of the event from USA, UK and Japan. It was attended by invited delegates that were mostly Japanese with some from Southeast Asia and Africa.

7.9.3 Forensic Geology and the Institute of Forensic Science in China^{1,14}

Since 2011, IUGS-IFG has been seeking to develop forensic geology in China. In 2015, three members of the China Institute of Forensic Science were identified to become affiliated to IUGS-IFG, via the Geoforensic International Network (GIN). IUGS-IFG is pleased to welcome the Institute of Forensic Science in China.

7.9.4 Forensic Geology in Hong Kong^{8,11}

On 13th to 20th September 2015, IUGS-IFG was represented in Hong Kong in association with the Hong Kong Regional Group of the Geological Society and with support from the Geological Society of London. A presentation was given on forensic geology followed by discussions on the future development of forensic geology throughout China.

7.9.5 35th International Geological Congress (IGC), Cape Town, South Africa^{1,2,3,5,11,26,28}

In September 2015, an IUGS-IFG committee member visited South Africa to continue with the planning for the forensic geology session at the 35th IGC and joint meeting with the 5th International Meeting on Criminal and Environmental Forensics, on 27 August to 4th September, in Cape Town. Throughout 2015, IUGS-IFG has been discussing the possibility for joint meetings at the 35th IGC with the Medical Geologists (Colombian Observatory on Medical and Forensic Geology) and on Geoethics in association with the IUGS Task Group Global Geoscience Professionalism and Geoethics.

7.9.6 7th European Academy of Forensic Science, Prague, Czech Republic^{1,3,13,26}

IUGS-IFG was represented at the 7th European Academy of Forensic Science Conference, Prague, Czech Republic, on 6th to 11th September 2015. The conference was focused on, *'Pushing Boundaries and Working Beyond Borders.'* A keynote presentation was given on results from a European inter laboratory soil case work trial. Other presentations included the detection of Volatile Organic Compounds (VOCs) from body decomposition and its application to training cadaver-detection and blood-detection dogs, following on from case work and research conducted in the UK.

7.9.7 Location, Excavation and Examination of Clandestine Graves, Scotland³

On 14th to 20th September, as part of a Massive On line Open Learning (MOOC) course, with the University of Dundee and Future Learn, over 20,000 students signed up for a course entitled, *'Identifying the Dead'*. This included the properties of soil and their role in human decomposition. You tube interviews, video clips, activities and questions were included. One comment (out of over 800 direct responses) after learning about soil evidence was a student who commented; *'It's a fascinating subject!! I never knew how important soil would be.'*
(<https://www.futurelearn.com/courses/identifying-the-dead>)

7.10 OCTOBER

7.10.1 Hertfordshire Geological Society, St Albans, England¹

On 1st October 2015, IUGS-IFG was invited by Hertfordshire Geological Society to give a presentation on the history, developments and cases in forensic geology. In the past, two members of Hertfordshire Geological Society provided micro-palaeontological analysis to assist the UK Police for a missing person and murder case. This was attended by approximately 50 to 60 delegates and included an extended question and answer session.

7.10.2 Double Homicide, Northern Europe^{1,11}

In October guidance was provided by IUGS-IFG on the search for the graves for two missing persons in Northern Europe. This case involved the management of psychics.

7.10.3 Australian Facility for Taphonomic Experimental Research (AFTER)^{1,3,5,26}

The University of Technology Sydney (UTS) announced the opening of a new forensic research facility in 2016, called the, *'Australian Facility for Taphonomic Experimental Research (AFTER).'* IUGS-

IFG have provided geological and geophysical advice for AFTER. This facility is the first of its kind in Australia, and the only facility outside of the USA, that allows the donation of cadavers to study the process of human decomposition in a natural environment. Such facilities, often colloquially are referred to as 'body farms'. These allow geologists, researchers, police and forensic scientists to better understand the physical, chemical, and biological processes of soft and hard tissue degradation. The facility is being led by UTS in collaboration with the following partners: University of Wollongong, University of Sydney, Australian National University, University of Canberra, University of New England, Australian Federal Police, NSW Police, Victoria Police, Victorian Institute of Forensic Medicine, NSW Forensic and Analytical Sciences Services, and the Australian Nuclear Science and Technology Organisation. The aim of the research carried out by these collaborative partners is to assist with the search for, recovery and identification of victims remains including missing persons, and victims of homicide, genocide or mass disasters.

7.10.4 Analysis of Soil, VOCs and Leachate from a Homicide Grave, Northern Europe^{1,3,11,12}

In 2014, soil samples were taken by IUGS-IFG from the grave of a homicide victim who lay undiscovered for 15 years. These were subsequently analysed by IUGS-IFG, Helford Geoscience LLP, The James Hutton Institute and University of Staffordshire. The objective was to determine the chemistry, VOCs and mineralogy of the soils at, and in the immediate vicinity of the grave and whether organic compounds were present and detectable. This research is ongoing and is aimed at reducing open area ground searches so that a cost-effective and practicable ground search for burials can be deployed.

7.10.5 17th annual IAMG conference⁸

IUGS-IFG was represented at the 17th annual IAMG conference, held on 5th to 13th September 2015, in Freiberg, Germany. Over 300 participants attended from across the world, which also included a special, 'Day of Surveys' to acknowledge William Smith and 200 years of science and methodologies to construct maps.

7.10.6 Knaresborough Rotary Club, England¹

IUGS-IFG was invited to the Knaresborough Rotary Club Annual Dinner as guest speaker. A presentation on forensic geology was postponed and a new date will be considered in 2016.

7.11 NOVEMBER

7.11.1 Forensic Geology and the Brazilian Federal Police, Curitiba, Paraná, Brazil^{1,11,16,17}

On 19th to 20th November, the Brazilian Federal Police, along with the University of São Paulo, Federal University of Paraná and the Federal Technological University of Paraná promote the First South Brazilian Symposium on Research in Forensic Sciences, held at Curitiba, Paraná, Brazil. At this event, the initial first results of a project were discussed called, 'Microtraces and Traces of Forensic Interest.' This was supported by cUSD\$2,000 from the Ministry of Education, in Brazil (<https://sulforense.wix.com/sulforense>). In Brazil, steps are being taken for the provision over the next four years of numerous PhD and post-doctoral research in criminalistics, including forensic geology.

7.11.2 Lord Advocates Conference on Cold Cases, Scotland³

IUGS-IFG presented a keynote at the Lord Advocates conference on cold cases. This included the work carried out by IUGS-IFG and the wider skills the group brings to cold case investigations. This event drew attention to the use of miniaturised techniques allowing these to then apply an organic approach previously not possible.

7.11.3 IUGS-IFG Sub-Committee Meeting, Northern Europe^{3,11,12}

On 6th November 2015, a sub-committee meeting was held by teleconference to discuss the progress and publication of, 'A Guide to Forensic Geology', the 35th IGC in Cape Town, operational case work, the future development of IUGS-IFG, finance and funding.

7.11.4 International Conference on Engineering Geophysics, Al Ain, UAE^{1, 3, 11, 23}

The 3rd International Conference on Engineering Geophysics was held in Al Ain, UAE, on 15th to 18th November 2015. IUGS-IFG was involved in the Technical Committee, provided a keynote speaker and a speaker for the session entitled, 'Women in Geoscience'. IUGS-IFG also organise a session on forensic geology in collaboration with the UK National Search Adviser (National Crime Agency), to build upon the advancements and training that took place in Abu Dhabi, in 2012, organised with the Abu Dhabi Police.

7.11.5 Abu Dhabi Police, Forensic Geology Group^{1, 3, 11, 21, 22, 23}

IUGS-IFG began to collaborate with the Abu Dhabi Police, in Rome, in 2011. This led to the establishment of a knowledge transfer and training event in UAE, in 2013. The General Directorate of the Abu Dhabi Police has initiated a project to concentrate on geosciences and its applications to forensic investigations including the establishment of a Forensic Geology Group. On 17th November 2015, a meeting was held in Al Ain, UAE, attended by IUGS-IFG, Abu Dhabi Police and the UK Police National Search Adviser (UK National Crime Agency). A training programme was requested by Abu Dhabi Police Forensic Geology Group in 2017, to include land and water searches, crime scene examination and geological trace evidence collection and analysis. Abu Dhabi Police continue to remain on the IUGS-IFG committee, two additional serving officers are being considered to join the IUGS-IFG committee in 2016, to assist with the planning for training in 2017.

7.11.6 International Journal of Geosciences, Cultural Heritage and Forensics^{1,3,11,18}

An Adjunct Professor of Archaeology and Classics, at The American University, in Rome, invited members of the IUGS-IFG to act as Editorial Board members for a new, peer-review journal called the, 'International Journal of Geosciences Applied to Cultural Heritage and Forensics', by Science Publishing Group.

7.12 DECEMBER 2015

7.12.1 St Christopher's High School, Accrington, Lancashire, UK¹

On 1st December 2015, IUGS-IFG gave a presentation to St Christopher's High School, in Lancashire, England, years 7 to 13 pupils as part of the 'Aspirations Programme'. This included forensic geology and examples of how geologists may assist the Police investigate some crimes such as; ground searches for burials, water searches, crime scene examinations, geological trace evidence and environmental crimes.

7.12.2 Police National Search Centre, The College of Policing, NCA, Coventry, UK¹

On 17th to 18th December 2015, IUGS-IFG took part in a Continuation of Professional Development (CPD) event for PoISAs (Police Search Advisors), for the Police National Search Centre, The College of Policing. This included the provision of new search strategies and techniques to locate burials relate to homicide, terrorism and organized crime.

8 MAIN PRODUCTS IN 2015

8.1 Confidential Documents and Operations

Some of the IUGS-IFG committee members were contacted by the Police to provide advice, guidance and assistance with operational cases. As such, confidential documents and some events and activities remain restricted and are not included in this report.

8.2 Training Documents

As part of forensic geology training courses held in the UK, UAE, Sicily and Japan, IUGS-IFG produced and issued documents to accompany course work.

8.3 Website

IUGS-IFG web site was expanded and provides information on the IUGS-IFG committee, history, past, recent and future global events, contacts, papers, publications and popular press articles.

8.4 Flyer

IUGS-IFG flyer provides information on recent and selected future events in forensic geology and was issued on the web site and provided at global events throughout 2015.

8.5 Geoforensic International Network (GIN)

The Geoforensic International Network (GIN) brings together forensic geologists, geoscientists and invited police/law enforcement officers from around the world, who have a desire and interest in the development of forensic geology. IUGS-IFG is pleased to welcome representatives from China.

Those countries now represented in GIN include; Australia, Argentina, Belgium, Brasil, Canada, China, Colombia, England, France, Germany, Hungary, India, Iran, Ireland, Italy, Japan, Malta, Mexico, Namibia, New Zealand, Nigeria, Northern Ireland, Portugal, Russia, Scotland, South Africa, Spain, Sweden, Switzerland, Netherlands, United Arab Emirates, United States of America, Wales and the West Indies (Caribbean).

8.6 Certificates

IUGS-IFG certificates were issued to delegates who attended forensic geology training in UK, Japan and Sicily.

8.7 Newsletter

IUGS-IFG published the second newsletter in June 2015, which was subsequently issued and circulated globally.

8.8 Publications

A list of publications by IUGS-IFG and/or including IUGS-IFG committee members are presented in Appendix I.

9 MAIN PROBLEMS ENCOUNTERED IN 2015

9.1 Funding: A Principal Leadership Challenge

The provision of core funding from IUGS is crucial for the progression of IFG. This enables additional funding or funding in kind to be subsequently provided by stakeholders to enable global events and activities to take place.

9.2 Time Demands

The success of IUGS-IFG in the past five years has resulted in significant increased requests for collaboration and the setting up of forensic geology events. IUGS-IFG members also have significant demand for follow-on support and advice after project completion. IUGS-IFG has managed this by expanding the core committee and by delegation to fellow committee members, in particular encouragement of deployment of local teams.

9.3 Publications

IUGS-IFG continues to receive on a regular basis request for books and papers to be published on the subject of forensic geology. IUGS-IFG has been approached for the publication of books and a '*Journal of Forensic Geology*'. However, IUGS-IFGs focus remains the writing and publication of, '*A Guide to Forensic Geology*'. Other books and opportunities will be considered following its publication.

9.4 Competence, Accreditation, Regulation and Code of Conduct

There is no international organisation with the authority to regulate and accredit the work and practices of forensic geologists. This is being considered and addressed by IUGS-IFG. Currently those working operationally obtain accreditation through their own professional body and as chartered scientists.

9.5 Alignment with Forensic Science

IUGS-IFG has recruited a committee member to investigate the alignment of forensic geology with forensic science, which may differ in each country.

9.6 Effective Communication & Training

There is the need for training on techniques to facilitate communication between Forensic Geologists and the Police/Law Enforcement. For example, training in, *'Geology for Police Officers'* and the basic principles of *'Policing, Search and Crime Scene Examinations for Geologists'*, are required.

9.7 Security and Geopolitics

In some parts of the world increased security risks have prevented the advancement of forensic geology. As such, IUGS-IFG has not sent any members to localities where security risks remain high.

10 SUMMARY OF EXPENDITURES IN 2015

10.1 Bank Account & Management

The IUGS-IFG bank account remains in Aberdeen, Scotland, and is managed by Prof Lorna Dawson (IUGS-IFG Treasurer).

10.2 Summary of Accounts

The income and expenditure on the account for 2014 is summarised in Table 10.1. As the IUGS-IFG bank account is held in the UK, the income and expenditure is shown in £ sterling and \$USD equivalent. In 2015, IFG was successful in attracting additional funding for international events.

| DETAILS | COST GBP £ | LODGED GBP £ | BALANCE GBP £ | BALANCE USD \$ |
|--|---------------|-----------------|------------------|-------------------|
| Balance brought forward from 2014 | | | 9,921.33 | 15,121.85 |
| Transfer funds from IUGS (USD \$ 15,000) | | 9,586.31 | 19,507.64 | 29,737.78 |
| London event | 5,044.16 | | 14,463.48 | 22,048.38 |
| Sicily event | 2,390.32 | | 12,073.16 | 18,403.82 |
| Japan event | 1,983.62 | | 10,089.54 | 15,380.08 |
| England event | 79.87 | | 10,009.67 | 15,258.32 |
| UAE event | 396.12 | | 9,613.55 | 14,650.95 |
| | | | | |
| Totals | 9,894.09 | 9,586.31 | 9,613.55 | 14,650.95 |

Note: exchange rate, www.xe.com on 5th November 2011, 1 GBP = 1.52399 USD, 1 USD = 0.656173 GBP

Table 10.1 IUGS Treasurers Accounts 2015 Transaction

11 WORK PLAN FOR NEXT YEAR (2016)

In 2016, the objectives of IUGS-IFG are as follows:

- Progress the publication of, 'A Guide to Forensic Geology';
- Attendance at the 35th International Geological Congress, in Cape Town, South Africa. This may include the provision and organisation of a session on forensic geology and the 5th "International Conference on Criminal and Environmental Soil Forensics";
- Establishment of a joint meeting in Cape Town with the Medical Geologists (Proyecto Colombiano de Geología Médica y Forense) and the 5th International Professional Geology Conference (SIPGC) and the IUGS Task Group Global Geoscience Professionalism;
- Provision of training for the UK Police in ground searches for burials associated with crime and terrorism (tbc);
- Focus on developing Forensic Geology in Africa and Asia;
- Provision of ongoing in kind support for the MSc in Forensic Geology, University of Messina, Sicily, Italy;
- Consideration of the establishment, and encouragement of local contributions, for a course on forensic geology in Barcelona, Spain;
- Development and enhancement of ground search strategies and deployment of analysis of Volatile Organic Compounds (VOCs) and Leachate Plumes;
- Collaboration with Australian Taphonomy Experimental Research (AFTER);
- Engagement with schools and the general public to raise awareness of the applications of geology to police and law enforcement investigations;
- Presentation on the applications of forensic geology to ground searches and geological (trace) evidence, Yorkshire Group of the Geological Society of London, February 2016;
- Planning for the 3rd IberoLatin American Course of Forensic Geology, in Argentina, in 2017;
- Presentation on the applications of Forensic Geology to Crime Associated with Homicide, Terrorism and Organised Crime for the Western Institute of Mining and Metallurgy, Institute

of Materials Minerals and Mining, University of Keele, Department of Geology, UK, March 2017;

- Planning for forensic geology training with the Abu Dhabi Police, Forensic Geology Group, in 2017; and
- Further development and growth of the IUGS-IFG web site as a focal point for the availability and global distribution of information on Forensic Geology.

12 CRITICAL MILESTONES

Critical milestones for 2015 included the following:

- Development of the draft of, *'A Guide to Forensic Geology'*;
- Implementation of a new MSc course in Forensic Geology, at University of Messina, Sicily, Italy;
- Establishment of the Abu Dhabi Police, Forensic Geology Group;
- Representation of forensic geology in Japan, at the International Symposium on the Development of Forensic Geology, 122nd Annual Meeting of the Geological Society of Japan
- Provision of geological support to the Police for some high profile crimes in the UK and Internationally; and
- Establishment of forensic geology in China, including a visit to Hong Kong and the assignment of three geologists from China to the Geoforensic International Network (GIN).

13 ANTICIPATED OUTPUTS TO BE ACHIEVED FOR 2016

The main outputs expected for 2015 include the following:

- Completion of the final draft of, *'A Guide to Forensic Geology'*;
- IUGS-IFG representation at the Forensic Geology session, at the 35th International Geological Congress, in Cape Town, South Africa;
- Delivery of further training, knowledge transfer and outreach events; and
- Publications and marketing of IUGS-IFG.

14 BUDGET FOR 2016

In 2016, IUGS-IFG aims to finalise the draft of, *'A Guide to Forensic Geology'* and, depending on the publisher's timeframes, work toward publication.

In 2015, IUGS-IFG was successful in obtaining funding in-kind for its global events. This enabled IUGS-IFG to therefore conserve some of core funding received from IUGS. IFG aims to utilise its funding to hold a committee meeting at the 35th IGC in Cape Town and to collaborate with; the 5th International Conference on Criminal and Environmental Soil Forensics, the 5th International Professional Geology Conference (5IPGC) and the IUGS Task Group Global Geoscience Professionalism and Geoethics, and the Proyecto Colombiano de Geología Médica y Forense.

In 2016, IUGS-IFG plans to break even or generate a small surplus funding, which can be carried forward to be reinvested in the development of forensic geology. IUGS-IFG will also continue to request and obtain contributory funding and funding services in-kind in addition to the core funding that is provided by IUGS. This approach is expected to provide a basis and for the continued global development and advancement of Forensic Geology.

In 2011-2015 IUGS-IFG has been successful in attracting additional financial support to assist with international events. IUGS-IFG would request that we can 'roll forward' the current balance of GBP £9,613.55 USD\$14,650.95 to assist with the proposed meetings and events in 2016 especially the 35th IGC in Cape Town and the launch of, *'A Guide to Forensic Geology'*.

IUGS-IFG kindly requests the maximum available budget of USD\$15,000 funding from the IUGS Executive Committee for 2016 to help the group continue to pursue the global development of forensic geology throughout 2016 and beyond.

APPENDIX I: SELECTED PUBLICATIONS IN 2015

Books, Book Chapters and Monographs

1. Blau, S. and Forbes, S.L. (2016). Anthropology: Taphonomy in the Forensic Context. In: Payne-James, J., Byard, R.W. (Eds.) *Encyclopaedia of Forensic and Legal Medicine* (2nd ed). Elsevier Academic Press, Oxford, UK, 2016. pp. 227-235.
2. Forbes, S.L., Carter, D.O. (2015). Processes and Mechanisms of Death and Decomposition of Vertebrate Carrion. In: Benbow, M.E., Tomberlin, J.K., Tarone, A.M. (Eds.). *Carrion Ecology, Evolution and Their Applications*, Taylor and Francis, Surrey, UK, 2015. pp. 13-30.
3. Harrison, K, Dawson, L., Mackinnon, G. (in press) Interdisciplinary approaches to the search and location of buried bodies: a United Kingdom context. In: Henk Kars (Ed) *Soil Forensics*. Springer.
4. Khudooma, S.A.N. 2015. Forensic Archaeology: and introduction from the United Arab Emirates: Chapter 14. In: Mike Groen, W.J., Marquez-Grant, N., Janaway, R. (Eds). *Forensic Archaeology: A Global Perspective*, Wiley-Blackwell, April 2015, 616 pages
5. Molina, C.M. (2015) "Geología Forense". Capítulo 37. Tomo III - Investigación. Enciclopedia "Criminalística, Criminología e Investigación". Sigma Editores. 2da ed. pp. 1951-1968.

Refereed Journal Articles

6. Reavy, B., Swanson, M.M., Cock, P.J.A., Dawson, L.A., Freitag, T.E., Singh, B.K., Torrance, L., Mushegan, A.R., Talianky, M. (2015). Distinct circular single-stranded DNA viruses exist in different soil types. *Applied and Environmental Microbiology*, 81, 3934-3945.
7. Roberts, R.J., Dixon, R.D., Merkle, R.K.W. (2015) Distinguishing between legally and illegally produced gold in South Africa. *Journal of Forensic Sciences*, doi: 10.1111/1556-4029.12886, p7.
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22. Dawson, L.A., Sampson, A., McConochie., Harrison, K., Mackinnon, G., Jefferies, I., Donnelly, L.J. (2015). Soil in search and evidence in the case of a missing person Pamela Jackson. Proceedings of the 3rd International Conference on Engineering Geophysics, Session on Forensic Geosciences, Al Ain, UAE, FG05, 270-273.
23. Dawson, L.A., Forbes, S (2015). The IUGS IFG, an international forensic network. Poster and flyers at the 7th European Academy of Forensic Science Conference, Prague, Czech Republic, 6-11 September, 2015.
24. Donnelly, L.J., Harrison, M. (2015). A Collaborative Methodology for Ground Searches by a Forensic Geologist and Law Enforcement (Police) Officer: Detecting Evidence Related to Homicide, Terrorism and Organized Crime. Proceedings of the 3rd International Conference on Engineering Geophysics, Session on Forensic Geosciences, Al Ain, UAE, FG02, 260-268.
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26. Mayes, R.W., Dawson, L.A., Ross, J. (2015). Some new trends in the analysis and use of organic compounds as forensic markers in soil and related materials. University of Mainz, Germany, 7th July 2015.
27. Ruffell, A. (2015). Technology and Geoforensics. Proceedings of the 3rd International Conference on Engineering Geophysics, Session on Forensic Geosciences, Al Ain, UAE, FG01, 256-259. [Keynote Speaker]

28. Ruffell, A., Pringle, J., Donnelly, L. J., Forbes, S. (2015). Geophysics and the Search for Buried, Hidden and Sunken Objects. European Meeting on Forensic Archaeology, Pontoise, France, 27th to 29th August 2015.
29. Forbes, S.L. (2015). Physical and chemical indicators of cadaver decomposition. 1st Congreso Internacional Botanica Forense. Temuco, Chile. October, 2015. [Keynote Speaker]
30. Perrault, K.A., Stefanuto, P.-H., Lloyd, R., Rai, T., Stuart, B.H., Focant, J.-F., Forbes, S.L. (2015). Exploring new dimensions in cadaveric decomposition odour profiling using GC×GC-HRTOFMS. 7th European Academy of Forensic Science Conference. Prague, Czech Republic. September, 2015.
31. Rust, L., Nizio, K.D., Forbes, S.L. (2015). Odour profiling of aged blood training aids for cadaver-detection and blood-detection dogs using comprehensive two-dimensional gas chromatography. 7th European Academy of Forensic Science Conference. Prague, Czech Republic. September, 2015.
32. Forbes, S.L. (2015). Developing the first Australian forensic taphonomy facility. 7th National Histotechnology Conference/9th Asia Pacific International Academy of Pathology Congress. Brisbane, Australia. June, 2015.
33. Forbes, S.L. (2015). Adding another dimension to cadaver dog research in Australia. Virtual Symposium on Applied Separation Science. Online. May, 2015
34. Forbes, S.L. (2015). Adding another dimension to cadaver-detection dogs in Australia. American Society for Mass Spectrometry Sanibel Conference: Security and Forensic Applications of Mass Spectrometry. Clearwater Beach, Florida. January, 2015.
35. Forbes, S.L., Troobnikoff, A., Perrault, K.A., Nizio, K.D. (2015). GC×GC-TOFMS analysis of buried remains to determine the odour available to cadaver-detection dogs. 6th Multidimensional Chromatography Workshop. Toronto, Canada. January, 2015.
36. Perrault, K.A., Rai, T., Stuart, B.H., Forbes, S.L. (2015). Assessment of the seasonal variability in forensic decomposition odour profiling by GC×GC-TOFMS. 6th Multidimensional Chromatography Workshop. Toronto, Canada. January, 2015.

Popular Press & Media Articles

37. Britton, A.J., Helliwell, R.C., Lilly, A., Dawson, L.A. (2015). Carbon stocks in oceanic alpine landscapes. In: Romeo, R., Vita, A., Manuelli, S., Zanini, E., Freppaz, M., Stanchi, S. (Eds.). Understanding Mountain Soils: A Contribution from Mountain Areas to the International Year of Soils 2015. FAO, Rome, Italy, pp110-112.
38. Dawson, L.A. (2015). 'Crimes That Shook Britain 6: Angus Sinclair'. Crime & Investigation Network on 11th October at 9PM. Sky 553 & 554 (+1), Sky HD 555, Virgin 275, BT 328, Talk Talk 328.
39. Dawson, L.A. (2015). Podcast interview. Microbe Post on Society of General Microbiology web site.
40. Dawson, L.A. (2015) Catching History's Criminals: The Forensics Story, Episode 2. BBC Four, 25th June 2015. <http://www.bbc.co.uk/iplayer/episode/p02l4px7/catching-historys-criminals-the-forensics-story-2-traces-of-guilt>
41. Wald, C. (2015). Forensic science: The soil sleuth. Forensic geologist Lorna Dawson has pioneered methods to help convict criminals using the dirt from their shoes. <http://www.nature.com/news/forensic-science-the-soil-sleuth-1.17373>.

TV, Media and Radio Interviews

42. Radio interviews. e.g. <http://www.bbc.co.uk/programmes/b06gwmcp#play>

43. Inspecting Detectives, The Long Shadow of the World's End, Episode 3
<https://t.co/4LD3lloHxybbc.co.uk>
44. Interview with German TV programme Odysso will be aired on Thursday 19 November 2015 and it will be available to view at <http://bit.ly/1PwJp0Z> after broadcast5 (to be aired in 2016)
45. Approximately 30 TV/media related interviews and discussion in Australia and UK during 2016.

Web Sites

46. <http://www.bbc.co.uk/news/uk-england-leeds-34540213>
47. <http://www.vice.com/read/the-grave-hunter-0000622-v22n4>
48. <http://www.35igc.org/>
49. <http://britgeopeople.blogspot.co.uk/2015/04/mud-monsters-and-murders-can-geology.html>
50. <http://www.fao.org/3/a-i4704e.pdf>
51. <http://dx.doi.org/10.1128/AEM.03878-14>
52. <https://www.futurelearn.com/courses/identifying-the-dead>
53. <http://facstaff.buffalostate.edu/bergslet/ForensicGeology/news.html>
54. <http://www.strettoweb.com/2015/06/unime-via-workshop-field-training-geologia-forense/286959/>
55. <http://www.cngeologi.it/>
56. <http://247.libero.it/rfocus/23245690/1/unime-al-via-il-workshop-e-field-training-di-geologia-forense/>
57. <http://www.normanno.com/lavoro/universita/primo-workshop-di-geologia-forense-organizzato-da-unime/>
58. <http://www.mediaddress.it/windpress/fr/communiques/1516274/workshop-e-field-training-di-geologia-forense-della-iugs-ifg.html>
59. <http://www.geologibasilicata.it/Comunicazione/Mondo-Geologi/Unime-al-via-il-Workshop-e-Field-Training-di-Geologia-Forense-Stretto-web-Comunicati-Stampa2>
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62. <http://etna2000.com/aggregator/categories/1>
63. http://article.wn.com/view/2015/06/05/Workshop_e_Field_Training_di_Geologia_Forense_della_IUGSIFG/
64. http://it.anygator.com/articolo/unime-al-via-il-workshop-e-field-training-di-geologia-forense__3860930
65. <http://www.ambientegis.com/>
66. <http://comunicatistampa.unime.it/2015/09/14/geologia-forense-tra-studi-e-prove-pratiche-alle-ricerche-di-una-vittima-simulata-di-omicidio/#more-6403>
67. <http://comunicatistampa.unime.it/2015/06/05/workshop-e-field-training-di-geologia-forense-della-iugs-ifg/#more-5880>
68. <http://microbepost.org/2015/08/20/microbe-talk-august-2015/>
69. <http://www.nature.com/news/forensic-science-the-soil-sleuth-1.17373>

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70. <http://www.bbc.co.uk/iplayer/episode/p02l4px7/catching-historys-criminals-the-forensics-story-2-traces-of-guilt>
 71. <https://sulforense.wix.com/sulforense>

APPENDIX II: SELECTED PHOTOGRAPHS AND ASSOCIATED INFORMATION



Carlos Molina searching for mass graves in Colombia



Bog search for a Missing Person using Ground Penetrating Radar, Northern Europe



Pier Matteo Barone, The American University of Rome, talked about forensic geology, geophysics and archaeology, Prague, Czech Republic



Laurance Donnelly and Lorna Dawson working with the Police in Europe



Demonstrating forensic soil science and forensic archaeology, University of Dundee, Scotland



Lorna Dawson and Ekaterina Nesterina, in Latvia



Skip Palenik teaching the identification of minerals using optical microscopy, Namur, Belgium



Laurance Donnelly, searching for a suspected, shallow, homicide grave, Northern Europe



Lorna Dawson and crime writers Mark Billingham (left) and BBC TV Crime Writer, Ann Cleeves (right) at the launch of 'Time of Death' and 'The Moth Catcher', at the Harrogate Crime Festival, Harrogate, UK



Mike Ferguson (CAST & GIN), at University College London, giving a presentation which included the application of geophysics to ground at water searches in collaboration with IUGS-IFG



IUGS-IFG committee members speak about Forensic Geology on national TV, in Messina, Sicily, Italy



Skip Palenik geological trace evidence training, USA



Rob Fitzpatrick, in South Africa planning ahead for the 35th International Geological Congress



Geological investigations, Australian Taphonomy Experimental Research (AFTER)



Laurance Donnelly and Alastair Ruffell conducted experimental GPR over a suspect homicide grave in Northern Europe



Laurance Donnelly and Alastair Ruffell conduct experimental deployment of dogs and geophysics to locate buried items related to unmarked graves, in Northern Europe



IUGS-IFG with staff and delegates from the MSc in Forensic Geology, University of Messina, Sicily, Italy



IUGS-IFG with Carabinieri and Polizia and Staff from the University of Messina, Sicily, Italy



IUGS-IFG and Prof. Roberta Somma, University of Messina, Sicily, Italy

MSc Forensic Geology, Sicily: Training in Ground Search for Burials



MSc Forensic Geology, Sicily: Training in Crime Scene Examination & Geological Trace Evidence



IUGS-IFG 2nd Newsletter, issues in June 2015



INTERNATIONAL UNION OF GEOLOGICAL SCIENCES
INITIATIVE ON FORENSIC GEOLOGY
ELECTRONIC NEWSLETTER

Official Electronic Newsletter of the International Union of Geological Sciences, Initiative on Forensic Geology



1

The International Union of Geological Sciences (IUGS), Initiative on Forensic Geology (IFG), was officially launched during the 62nd Executive Committee Meeting of the IUGS, which was held at UNESCO headquarters, in Paris, France, on 22nd February 2011. The objectives of the IUGS-IFG are to:

- Collate and disseminate data and information on forensic geology applied to policing and law enforcement, criminal, environmental and civil investigations;
- Promote international meetings, seminars, conferences and training;
- Develop a 'Committee' to act as principal advisers, collaborators and active participants;
- Develop an international network whereby each 'member' will act as a principal contact in their respective country for the collation and dissemination of information on forensic geology;
- Collate, make available and where appropriate review any existing documentation and publications in forensic geology; and
- Produce a document endorsed by the Committee to be called; 'A Guide to Forensic Geology'.



IUGS-IFG Committee at the Annual General Meeting and Strategy Meeting, Geological Society of London, Burlington House, London, 4th-5th December 2014 (photo Skip Palenik)

The IUGS-IFG Committee comprises representatives from major geographical regions of the world and includes specialists from; academia, industry, consultancy, operationally based forensic geologists, the police, law enforcement agencies and forensic organisations.

Both IUGS-IFG and the Geoforensic International Network (GIN) brings together forensic geologists, geoscientists and invited police/law enforcement officers from around the world, who have a desire and interest in the development of forensic geology. Countries now represented in include; Australia, Argentina, Belgium, Brasil, Canada, Colombia, China, England, France, Germany, Hungary, India, Iran, Ireland, Italy, Japan, Latvia, Malta, Mexico, Namibia, New Zealand, Nigeria, Northern Ireland, Portugal, Russia, Scotland, South Africa, Spain, Sweden, Switzerland, Netherlands, United Arab Emirates, United States of America, Wales and the West Indies (Caribbean)



Flyer and Press Release for MSc in Forensic Geology and Field Training, University of Messina, Sicily, Italy

UNIVERSITÀ DEGLI STUDI DI MESSINA - VIA EADUATA, 48 (SCIENZE E TECNOLOGIE)
DIPARTIMENTO DI SCIENZE DEL AMBIENTE, DELLA INGEGNERIA, DEL TERRITORIO, DEGLI AMBIENTI E DELLA SALUTE (IAGS-TALS)
MASTER GEOLOGIA FORENSE - MASTER SCIENZE FORENSI

WORKSHOP AND FIELD TRAINING ON FORENSIC GEOLOGY

10th-11th June 2015 (10th-11th June 2015) | 10th-11th June 2015

WORKSHOP - 10th June 2015

10:00-11:00: Welcome coffee

11:00-12:00: Chairmen and Guest of the Master in Forensic Geology
 Prof. Lorna Dawson - Chairwoman of the University of Messina
 Prof. Lorna Dawson - Chairwoman of the University of Messina
 Prof. Lorna Dawson - Chairwoman of the University of Messina
 Prof. Lorna Dawson - Chairwoman of the University of Messina
 Prof. Lorna Dawson - Chairwoman of the University of Messina
 Prof. Lorna Dawson - Chairwoman of the University of Messina

12:00-13:00: Lunch

13:00-14:00: 30th Anniversary of the IUGS Initiative on Forensic Geology

14:00-15:00: Chairmen and Guest of the Master in Forensic Geology

15:00-16:00: Presentation of the Master in Forensic Geology

16:00-17:00: Presentation of the Master in Forensic Geology

17:00-18:00: Presentation of the Master in Forensic Geology

18:00-19:00: Presentation of the Master in Forensic Geology

19:00-20:00: Presentation of the Master in Forensic Geology

FIELD TRAINING - 11th June 2015

09:00-10:00: Presentation of the Master in Forensic Geology

10:00-11:00: Presentation of the Master in Forensic Geology

11:00-12:00: Presentation of the Master in Forensic Geology

12:00-13:00: Presentation of the Master in Forensic Geology

13:00-14:00: Presentation of the Master in Forensic Geology

14:00-15:00: Presentation of the Master in Forensic Geology

15:00-16:00: Presentation of the Master in Forensic Geology

16:00-17:00: Presentation of the Master in Forensic Geology

17:00-18:00: Presentation of the Master in Forensic Geology

18:00-19:00: Presentation of the Master in Forensic Geology

19:00-20:00: Presentation of the Master in Forensic Geology

Un prestigioso master di primo livello all'Ateneo messinese

A Messina i massimi esperti dei casi di geologia forense

Un corso unico nell'Unione Europea: ricrea una "scena del crimine"

Geologia Forense

Messina

Un'aula di un percorso di studio innovativo, ad altissimo livello accademico, che ha permesso di creare un corso unico in Europa: il Master in Forensic Geology. Il corso è organizzato dal Dipartimento di Scienze del Territorio, della Sanità e dell'Urbanistica, della Facoltà di Scienze della Terra, della Università degli Studi di Messina.

Un corso unico in Europa: ricrea una "scena del crimine"

Il corso è organizzato dal Dipartimento di Scienze del Territorio, della Sanità e dell'Urbanistica, della Facoltà di Scienze della Terra, della Università degli Studi di Messina.

Un corso unico in Europa: ricrea una "scena del crimine"

Il corso è organizzato dal Dipartimento di Scienze del Territorio, della Sanità e dell'Urbanistica, della Facoltà di Scienze della Terra, della Università degli Studi di Messina.

Un corso unico in Europa: ricrea una "scena del crimine"

Il corso è organizzato dal Dipartimento di Scienze del Territorio, della Sanità e dell'Urbanistica, della Facoltà di Scienze della Terra, della Università degli Studi di Messina.

Example of IUGS-IFG certificate for delegates attending training in Forensic Geology

IUGS INITIATIVE on FORENSIC GEOLOGY
SCIENZE FORENSI
MASTER GEOLOGIA FORENSE UNIME
The Geological Society
The James Hutton Institute
AMBR GEO
CONSIGLIO NAZIONALE DEI GEOLOGI

ALFATEST, Malvern, Comune Ali

We hereby certify that

Prof. Roberta Somma

Participated in the workshop, knowledge transfer and training for the

MSc in Forensic Geology and MSc in Forensic Sciences

held at the

Università degli Studi di Messina, Sicily, Italy, 10th-11th June 2015

Dr Laurance Donnelly, IUGS-IFG, Chair
Rosa Maria Di Maggio, IUGS-IFG, Officer for Europe
Prof Lorna Dawson, IUGS-IFG, Treasurer
Dr Alastair Ruffell, IUGS-IFG, Training
Dr Jennifer Mckinley, IUGS-IFG, Communications

IUGS-IFG & MSc in Forensic Geology, University of Messina, Sicily, Italy



MASTER IN GEOLOGIA FORENSE - 1 EDIZIONE (A.A. 2014/2015)

Giornate sulla Geologia Forense
17 Settembre 2015, Palazzo Bruccacci Ali (Messina)

**RAG MAP OF THE CAPPUCCINI AREA (ALI, MESSINA):
THE MURDER OF JASMINE**

Roberta Somma⁽¹⁾, Massimiliano Silvestro⁽²⁾, Maria Cascio⁽²⁾
& Laurance Donnelly⁽³⁾

⁽¹⁾ Dipartimento SASTAS, Università di Messina, ⁽²⁾ Land Engineering Messina, ⁽³⁾ The International Union of Geological Sciences (IUGS) Initiative on Forensic Geology (IFG)

DIPARTIMENTO DI SCIENZE DELL'AMBIENTE, DELLA SICUREZZA, DEL TERRITORIO, DEGLI ALIMENTI E DELLA SALUTE (S.A.S.T.A.S.) CARMELO ABBATE
UNIVERSITÀ DEGLI STUDI DI MESSINA

Field training organized, in the framework of the Master in Forensic Geology (Dip. SASTAS) and of the Master in Forensic Science (Dip. Scienze Chimiche), of the University of Messina and of the Comune di Ali, with the patronage of the Polizia di Stato, del RIS - Messina, della IUGS-IFG e del Consiglio Nazionale dei Geologi.

Con il patrocinio di:

Comitato tecnico-scientifico ed organizzatore:
Dott. Pier Matteo Barone
Dott.ssa Rosa Maria Di Maggio
Prof.ssa Concetta De Stefano
Prof. Giacomo Dugo
Sindaco Pietro Fiumara
Sott. Commissario Paolo Lanardi
Ten. Colonnello Sergio Schiarone
Dott. Massimiliano Silvestro
Dott.ssa Roberta Somma

MODALITÀ DI ISCRIZIONE. AGRINA-GERI-FORZE DELL'ORDINE
Per ragioni organizzative l'adesione alla giornata è limitata ad un massimo di 20 partecipanti. Per iscrizioni prenotarsi invitando entro le ore 12.00 di giorno 4 settembre una mail a: rovanna@unime.it. Saranno riconosciuti 0,5 CFU ai partecipanti alla giornata.

EVENTUALE PERNOTTAMENTO
Hotel Terme Acqua Grezia Via F. Crispi, 187, 98021 Ali Terme ME.
tel.: 0943 701814 - www.hoteltermecappagnina.com -
Il Principe B&B, Via Marchesi di Granatelli 4, Ali Terme, Cell.: 3336555081 - www.ilprincipeb&b.com

Field training di Geologia Forense per la ricerca di oggetti sepolti in test site predisposti
Giovedì 17 Settembre 2015, ore 9:00
Ali (Messina)



IUGS-IFG & the International Symposium on Development of Forensic Geology, 122nd Annual Meeting of the Geological Society of Japan

2015 9/11(金)~13(日)
シンポジウム / 観劇セッション / セッション

日本地質学会 第122年学術大会

日本の要で地質学セミナー!

長野大会
メイン会場
信州大学長野校(工学)キャンパス

▼地質情報展 2015 ながの 9/11(金)~13(日)
▼記念講演・懇親会 9/11(金)
▼市民講演会 9/12(土) 14:30~16:00
▼普及・教育行事 9/13(日) 8:30~16:00

一般社団法人 日本地質学会
〒101-8305 東京都千代田区有明 2-8-15 有明ビル8F
TEL: 03-5823-1150 http://www.gsjociety.jp

Overviews of IUGS-IFG and GIN S3-P-5

SUGITA Ritsuko¹, Laurance DONNELLY²

International Union of Geological Sciences (IUGS), Initiative on Forensic Geology (IFG)
The International Union of Geological Sciences (IUGS) Initiative on Forensic Geology (IFG) was established in 2011 to develop forensic geology internationally and promote its applications.

Geoforensic International Network (GIN)
As part of IUGS-GIM Working Group on Geoforensics, a former body of IFG established in 2009, the Geoforensic International Network (GIN) was launched. GIN then became incorporated into IUGS-IFG. The IUGS-IFG Committee comprises representatives from major geographical regions of the world and includes specialists from: academia, industry, consultancy, operationally based forensic geologists, the police, law enforcement agencies and forensic organizations.

Objectives of IUGS-IFG

1. Collate and disseminate data and information on forensic geology applied to policing and law enforcement, criminal, environmental and civil investigations.
2. Promote international meetings, seminars, conferences and training.
3. Develop a "Committee" to act as principal advisers, collaborators and active participants.
4. Develop an international network whereby each "member" will act as a principal contact in their respective country for the collation and dissemination of information on forensic geology.
5. Collate, make available and where appropriate review any existing documentation and publications in forensic geology, and
6. Produce a document endorsed by the Committee to be called: "A Guide to Forensic Geology".

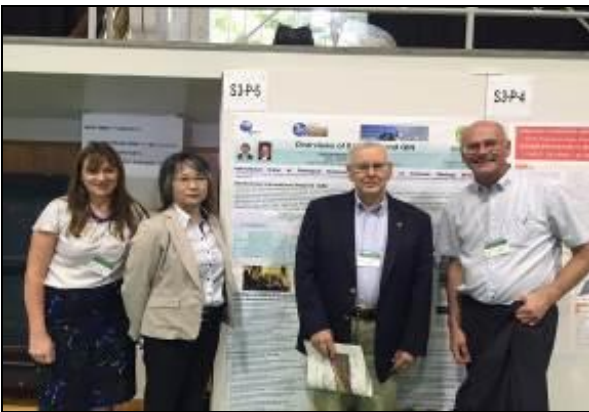
A Brief History related to IUGS-IFG and GIN

- 2002: Presentation on Forensic Geology in the context of Common, Westminster Palace, London by Donnelly.
- 2005: Forensic Geoscience meeting in London.
- 2006: Establishment of the Geological Society of London, Forensic Geoscience Group (FGG).
- 2009: Establishment of the IUGS Commission on Geoscience for Environmental Management (GEM).
- 2009: Geoforensic Working Group.
- 2011: Establishment of the IUGS-IFG.

Activities of IUGS-IFG and GIN members

Academic Meetings and Sessions in Conferences

Knowledge Transfer and Training



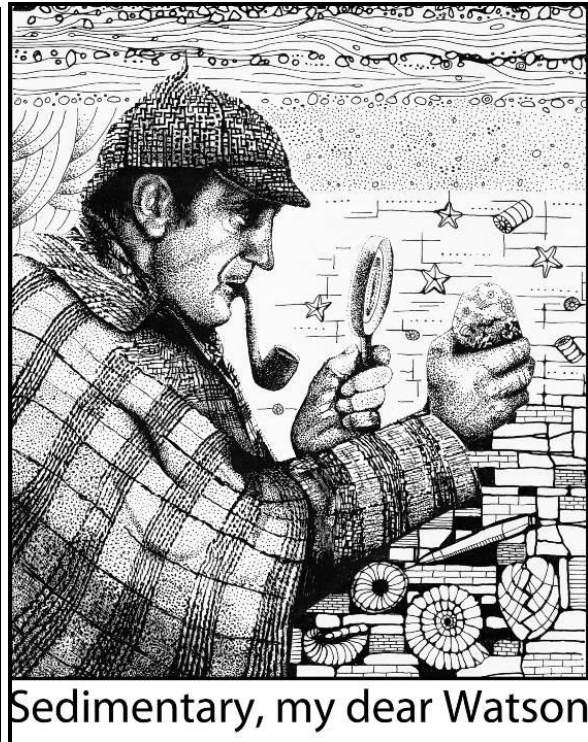
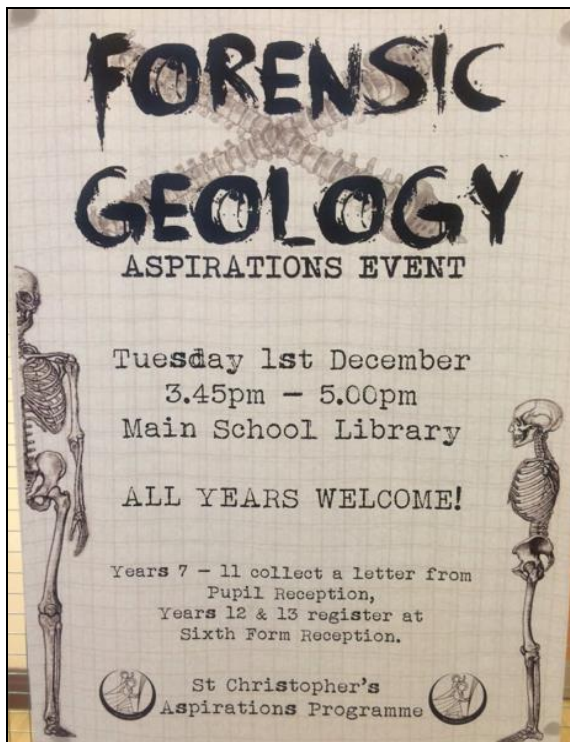
IUGS-IFG & Collaboration with the Abu Dhabi Police, Forensic Geology Group



Abu Dhabi Police, Forensic Geology Branch



(Left) Flyer for a Forensic Geology Presentation to School Children, Years 7 to 13, St. Christopher's School, Accrington, Lancashire. (Right) UK Marketing of Forensic Geology used by IUGS-IFG and Geological Society of London (GSL) Forensic Geoscience Group (FGG)



For further information
<http://www.forensicgeologyinternational.org> or <http://www.forensicgeologyinternational.org>



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