INTERNATIONAL SOCIETY ON TOXINOLOGY

NEWSLETTER

December 2009

UPCOMING MEETINGS

Pan-American Section IST
Hotel Real International, San Jose, in Costa Rica, April 18-22, 2010. Details available, both on the IST website and on a site for this Congress, at panamist.icp.ucr.ac.cr. The contact person for this meeting is Prof. Gutierrez, JOSE.GUTIERREZ@ucr.ac.cr.

Asia-Pacific Section IST
The next meeting of the Asia-Pacific Section of the IST will be in Vladivostock, Russia, in September 4-8, 2011, at the Conference Hall of the Primorsky Region Administration (details to be posted later). Current contact person is Marina Tretyak. The main topics are; toxin structure & mode of action, proteomics & genomics, drug development, clinical toxinology, toxins miscellaneous. Organising Committee Chairmen are; Prof. Eugene Grishin and Prof. Valentin Stonik..

European Section IST
Valencia, Spain, details pending

IST World Congress
Hawaii, 2012, details pending.

The NP2D (Natural Peptides to Drugs, http://www.np2d.com) congress will take place in Zermatt (Switzerland) from April 11th to 14th, 2010. For further information, contact Dr. Reto Stocklin at reto.stocklin@atheris.ch.

FROM THE IST EXECUTIVE

This is the third of the IST's new electronic format, email distributed newsletters. I welcome feedback from IST members on what they want to see included (and excluded) in future newsletters. I also welcome items from IST members for inclusion in the newsletter. This should become an easy way for members to communicate to the whole membership, on matters of toxinologic interest, such as upcoming meetings, legislative and government changes affecting toxinology, and broad views of research developments. However, the newsletter is not for announcing research findings; that remains the realm of peer reviewed publications, especially Toxicon. Wherever practical, try and offer your papers to Toxicon for publication. Toxicon continues to improve it's impact factor and general standing. It is in all our interests that this trend continue.

The Pan-American Section meeting is in April next year, so register now. There are a number of toxinology-related meetings scheduled in 2010. Look for information on these in this Newsletter and on the IST website (www.toxinology.org). There are also some research position/job offers in toxinology and some articles in this edition.

Lastly, for some, possibly many members, we are entering an important religious and festival holiday season. For all IST members who celebrate Christmas, I wish you a joyous Xmas season, and for those who don't celebrate Christmas, well I wish an equally joyous time.

Julian White, Secretary/Treasurer, IST

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MEMBERSHIP ANNOUNCEMENTS

The IST Membership Database has been updated, a process that will be ongoing. Please let the IST Secretary know if you change any of your contact details (email, phone, address etc). It is hoped that the Membership Database can be made available to all IST members via the IST website, with password protection for access.

Because of file size, the Newsletter may be too big for some member's email accounts and so it may be more practical to post the Newsletter on the IST website and just email members advising it is ready to download, via a link.

Last Newsletter I raised the issue of access to email addresses by non IST members. Members may prefer to keep email addresses more secure, using the new membership online database, once this is operational, rather than list addresses in the publicly accessible Newsletter. As IST Secretary, I will take direction from the membership on this issue and will not include members email addresses in the Newsletter until and unless it is clear that is what most members want. So far, though, IST members have not told me what they want regarding this matter.

Julian White
Secretary/Treasurer IST

IST STUDENT MEMBERS - THIS IS FOR YOU - ACTION PLEASE!
An announcement for the formation of a Special Interest Group for Student Toxinologists

Students have been an important and valued part of IST since the inception of the Society in 1962. To emphasize the importance of the role of students in the IST, the creation of a Special Interest Group for Student Toxinologists has been proposed.

The aims of the Special Interest Group for Student Toxinologists would include: to increase opportunities for students to network with possible collaborators and employers; to work with the Executive and Council, IST to ensure students are included and supported in future decisions of the IST; and to train students to become contributing members to the IST and other professional societies.

The IST is looking for student members interested in being a part of such a network, and for those students (preferably with experience with other organizations) who would like to be considered for leadership positions. Any students interested in participating in such a network should contact the following by email (please send your email to the Secretary, IST, with cc to the President, IST and to student member Maggie Gentz):
julian.white@adelaide.edu.au
antgopal@nus.edu.sg
m.gentz@uq.edu.au

THE FUTURE OF THE IST NEWSLETTER

The IST Newsletter needs input from IST members to make it a more effective communication tool within the Society. The move to electronic format may open up opportunities for new sections. For instance, it might be possible to have annotated bibliographies of recent toxinology publications from other journals, or reports of other meetings with toxinology content. Available toxinology-related jobs and student postings could be listed. There are doubtless many other possibilities members may think of.

So I ask all IST members to consider what they want from the Newsletter and let me know by email. I also want to hear from IST members prepared to contribute regular sections to the Newsletter. To be vibrant and relevant the Newsletter must become more than just a brief report on IST business by myself and our President, but that requires your input.

Julian White
Secretary/Treasurer IST
julian.white@adelaide.edu.au

MESSAGE FROM THE PRESIDENT (I.S.T)

Dear Fellow Toxinologists and Friends

It is the end of the year, so holiday and festive season again. I am sure that you all had a wonderful 2009 with achievements and good health and looking forward to 2010 for peace, prosperity and progress.

With the financial downturn still looming around and possible threat of bioterrorism we have to have a positive and hopeful attitude towards our future and contribute to the "toxinology" field adding to the existing knowledge and explore the proteomic and genomic technologies to provide new insights.

With the whole world concerned about global warming, climate change and preserving the biodiversity, I.S.T also has a responsibility in utilizing the "natural' resources from where "natural toxins are derived and preserve them, rather than exploiting them.

The World Congress and the regional congresses are taking shape and some information relating to these events are available in the newsletter.

Various committees and working groups have been established, such as "Nomenclature Committee" "Global Snake Bite Initiative (GSI)", "Clinical Toxinology Network", etc. The chairperson of these groups will provide us with brief reports in the newsletter.

I also urge the IST council members to promote I.S.T. activities in the region such as National Meetings and also to recruit new members and to organize student activities. Council members are also encouraged to write brief reports to the newsletter on their achievements and their vision to the region.

All of us together can re-energize I.S.T and make it to the next level in 2010.

Together we can achieve.

Merry Christmas, Happy New Year

Greetings of the Season.

Gopal

IST Nomenclature Committee

At the last IST World Congress held in Recife, Brazil in March 2009, a symposium devoted to the topic of toxin nomenclature received significant interest from IST members. The IST Council subsequently decided to form a nomenclature committee to examine the issue of toxin naming standards and recommend possible solutions. The mandate of this committee is to propose a nomenclature system, with interim reports to IST Council and a "final" report to be delivered at the IST World Congress in 2012.

If you have any comments or suggestions on toxin nomenclature, could you please send them to a member of the nomenclature committee, which is currently comprised of the following members:

Dr Gerardo Corzo, Mexico (Email: corzo@ibt.unam.mx)
Dr Florence Jungo, Switzerland (Email: Florence.Jungo@isb-sib.ch)
Dr Evanguedes Kalapothakis, Brazil (Email: ekalapo@icb.ufmg.br)
Prof. Glenn King, Australia (Chairman; Email: glenn.king@imb.uq.edu.au)
Prof. Manjunatha Kini, Singapore (Email: dbskinim@nus.edu.sg)
Prof. Graham Nicholson, Australia (Email: graham.nicholson@uts.edu.au)
Prof. Toto Olivera, USA (Email: olivera@biology.utah.edu)
Prof. Jan Tytgat, Belgium (Email: jan.tytgat@pharm.kuleuven.be)

ArachnoServer spider toxin database

ArachnoServer is a manually curated database that provides detailed information about proteinaceous toxins from spiders. Key features of ArachnoServer include a new molecular target ontology designed especially for venom toxins, the most up-to-date taxonomic information available, and a powerful advanced search interface. Toxin information can be browsed through dynamic trees, and each toxin has a dedicated page summarising all available information about its sequence, structure, and biological activity. ArachnoServer currently manages 567 protein sequences, 334 nucleic acid sequences, and 51 protein structures. ArachnoServer is available online at www.arachnoserver.org.

LETTERS SECTION

Ophidia Products, Inc
4509 Mimosa Drive
Bellaire, Texas 77401
Tel:/Fax 713-667-4027
Website: www.ophidia.com

September 30, 2009

Dr. Julian White:
Secretary/Treasurer of the IST
Toxinology Department
Women's and Children's Hospital
North Adelaide SA 5006, AUSTRALIA

Dear Julian:

I have written this letter to convey that at Ophidia Products Inc., we have developed precisely six therapeutics, five from snake venoms and one from opossum serum. All patented therapeutics are in synthetic forms each, consisting of ten amino acids. One of the therapeutic ADESH licensed out to Nymox Pharmaceuticals Inc, is FDA approved for the treatment of Alzheimer's disease. Five therapeutics are available for licensing.

I will appreciate very much if you would provide the names of the Australian companies, who may be interested, so that I can contact them. Enclosed please find brief descriptions of the licensing technologies and my CV. I will e-mail the whole document in order to enable you to pass it on easily.

With regards,

Binie V. Lipps

EDITORS NOTE: Dr. Lipps sent many pages of detail on his work and products, too many to place in the Newsletter. Those interested should contact Dr. Lipps via the website listed above.

POSITIONS ON OFFER

Title: Post-doctoral positions at the Center for Applied Toxinology (CAT-cepid FAPESP) Instituto Butantan

Working area: Biochemistry/Pharmacology/Cell Biology

FAPESP process: 1998/14307-9

Project title: Center for Applied Toxinology

Field of knowledge: General Biology

Principal investigator: Hugo Aguirre Armelin, Yara Cury, Ana Marisa Chudzinski Tavassi and Solange Maria de Toledo Serrano.

Unit/Instituition: Instituto Butantan

Application deadline: January 05, 2010

Four post-doc positions are available at the Center for Applied Toxinology. The projects are funded by a grant from Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP). The positions are linked to the projects described below:

-Project #1: The main goal of this project is to evaluate the molecular and cellular mechanisms involved in the analgesic activity of crotalphine, a peptide isolated from the venom of *Crotalus durissus terrificus.* Candidates should have experience with in vitro assays to evaluate the molecular and cellular mechanisms of pain and analgesia such as culture of neuronal cells as well as immunochemistry and immunoenzymatic assays. Prior experience with in vivo behavior assays to evaluate pain is also desirable.

-Project #2: "Proteomics applied to the analysis of the functional interaction of snake venom proteinases with cell and plasma targets". The project aims to apply proteomic approaches to study the mechanisms of action and the structure-function relationship of hemorrhagic snake venom metalloproteinases. Applicants should have experience with proteomic analysis using 2D-electrphoresis and mass spectrometry, immunoenzymatic assays, protein isolation, protein recombinant expression and assays to detect protein-protein interaction.

-Project #3: The project aims to evaluate the mechanisms of action of proteins and peptides affecting the hemostatic system or capable of modulation cell survival. Candidates should have experience with cell

POSITIONS ON OFFER

Kentucky Reptile Zoo
Venom Grant Program

Kentucky Reptile Zoo announces a venom grant program. This program is designed to provide venom free of charge for a specific research project in a university setting. The recipients will be chosen based on merits of the proposed research, at the discretion of the Kentucky Reptile Zoo Board of Directors. Grants will typically be made for one gram of venom; however larger quantities will be considered on a case-by- case basis. Grant seekers should submit a research proposal and statement of need via email to reptilezoo@bellsouth.net. Graduate students are especially encouraged to apply; however the grant is not restricted to students.

The Global Snakebite Initiative

Background

This important project is the first major undertaking resulting from the ***Global Issues in Clinical Toxinology Conference***, held in Melbourne, Australia, November 2008. At this meeting, attended by stakeholders from all continents (except Antarctica), a steering committee was formed to move towards solutions for envenomed patients Worldwide. It was considered by this meeting, attended by some senior IST members, that this process would best be promoted by close association with the IST, as a project under the IST banner. At the Asia-Pacific Section Congress in Vietnam in December 2008, a proposal was made by Prof. David Warrell, seconded by Prof. P Gopalakrishnakone (IST President), that "The Global Snakebite Initiative be formally endorsed as an official initiative of the IST." This was passed unanimously and confirmed unanimously at the IST World Congress in Recife, Brazil, March 2009. This important initiative is now officially a project of the IST. The Steering Committee, which contains a number of IST members, will produce a work plan and timeline to present to all IST members. A new website to promote the Initiative has been launched at www.snakebiteinitiative.org and it is to be hoped that this will progress to a major resource for the Initiative.

Global Snakebite Statistics

Recent research by Kasturiaratne et al, published in PLoS, has redefined global estimates of snakebite epidemiology. However, this is, to some extent, a "work in progress". One of the authors, Prof. Janaka de Silva (Sri Lanka) has kindly made available some of the data tables on which the study conclusions were based, with a "challenge" to IST members (and others) to provide more definitive data for each listed country. These tables will be listed on a separate page structure for the IST website (www.toxinology.org). All interested members are urged to peruse this information and contact Prof. de Silva if they have additional data that might be used to update the tables. This work may be considered as one section of the Global Snakebite Initiative.

An Update

Work on developing a Global Snakebite Initiative website (www.snakebiteinitiative.org) is continuing, and new content on the snakebite situation in India, Nepal and Nigeria will be coming online before the 31st December, thanks to contributions from Drs Vijay Pillay (India), Sanjib Sharma (Nepal) and Abdul Habib (Nigeria). The website is likely to receive a large increase in traffic in January, with the publication of a position paper on snakebite, and the role of the GSI, due out in the The Lancet in the first weeks of the new year. Another paper is currently in press at Toxicon, and as soon as these two important publications are in print, we will provide links to the Journals from the GSI website. Anyone who is willing to take on a position as a country information contributor to the website is encouraged to contact David Williams (toxinologist@hotmail.com) who is currently coordinating the site content.

Emergency physician Dr Simon Jensen is interested in collating information on the present situation regarding first aid for snakebite, and the treatment of the local effects of snakebite, particularly by vipers and some cobra species. The aim of these two exercises is to enable a collaborative review of the current best practice in different countries and regions, so that GSI members can prepare a white paper on each topic for discussion at upcoming IST conferences, with the aim of producing practice guidelines for various regions of the world that can be made available freely through the website. Simon is eager to hear from anyone who would be interested and willing to collaborate with him to move this process forward. If you are able to make a contribution, please contact Simon by email (simondjensen@hotmail.com).

Finally, progress is being made in relation to determining how best to formally register the GSI as a charity NGO, so that funding for projects can be sought, and donations properly administered. A report will be submitted to GSI Committee members in February 2010, and hopefully there will be enough members present at the Pan-American IST meeting in Costa Rica next April, for this issue to be discussed and a resolution adopted that can then be presented to the IST Executive Committee for endorsement and approval.

David Williams on behalf of GSI

The Clinical Toxinology Initiative

The issue of specialist-level training for medical doctors, in the field of clinical toxinology, and credentialling of such training, was canvassed at the Global Issues in Clinical Toxinology Conference and again, through presentations, at the Asia-Pacific Section Congress in Vietnam. As a result a proposal was put by Prof. Julian White, seconded by Prof. Dietrich Mebs, that "The Asia-Pacific Section of the IST supports the development of a clinical toxinology initiative by the IST." This was passed unanimously and confirmed unanimously at the IST World Congress in Recife, Brazil, March 2009. This important initiative is now officially a project of the IST. A Steering Committee will be established and a report to IST members. The IST will now work towards establishing clinical toxinology as an accredited and recognised medical specialty.

As part of this process, Prof. White has had initial informal discussions with some "key players" in the medical toxicology field, in North America, Europe and Australia. While very early in the whole process, these discussions have been positive and encouraging. Similar positivity was evident in discussions with WHO personnel, although again these were informal and the WHO has not yet been approached to support this initiative.

One likely outcome of developing clinical toxinology under the banner of the IST will be an increase in clinician membership and resurgence of clinical papers and posters at IST meetings, alongside the more basic and applied toxin research. The latter will not be in any way devalued by development of IST involvement in clinical toxinology. It is intended these two aspects of toxinology will grow in partnership.

It should also be recognised that the IST membership has been active in clinical toxinology training for many years, most notably the long-standing French course run through the Paris Museum of Natural History (now in it's 30th year - congratulations to Max Goyffon), the International Clinical Toxinology Short Course (held in Adelaide since 1997), and the Brazilian course. The latter hosted discussions on clinical toxinology training at the IST World Congress in Brazil, March 2009, thanks to the efforts of Profs. Baravierra and Haddad.

The next international Clinical Toxinology Short Course will be held in Adelaide, Australia, March 2-7, 2010 (see details later in this Newsletter; pages 20-23). The faculty for this course has been expanded and this will provide a nucleus of committed individuals to start active development of a full clinical toxinology course, likely spanning multiple institutions and continents.

We would like to hear from clinicians with an active involvement treating clinical toxinology cases who are interested in becoming part of the process of developing and staging a global full course. If you fit this picture, please contact Prof. White at julian.white@adelaide.edu.au.

What we will likely require is a series of hospitals, each with a significant number of toxinology cases likely over a short time period, and with resources to host clinical toxinology trainees. This will provide trainees with direct exposure to and experience with treating actual toxinology cases and in a relevant local setting. It is envisaged that trainees will be fully qualified doctors, probably with higher-level qualifications in a specialty such as emergency medicine, intensive care medicine, or tropical medicine.

In parallel with this we need to develop close working relationships with key medical craft groups in individual countries, as these will be the local certifying bodies for the training scheme. Again, IST members who might fit this profile are invited to contact Prof. White.

We should not expect this process to deliver a solution quickly. It will take considerable time to set up both training facilities in selected locations, and the requisite national craft-group agreements. However, if set up appropriately, the scheme should be independent of any one key person and so have a likely long term future and viability.

Julian White

NEXT IST WORLD CONGRESS

At the most recent IST World Congress in Brazil, March 2009, members present at the Business Meeting of the IST indicated interest in Hawaii being the venue for the next World Congress. However, Dr. Angel Yanagihara, from Hawaii, indicated she was not yet in a position to confirm the viability of holding the Congress there. Prof. Gopalakrishnakone also presented a comprehensive bid from Singapore. Normally this would then require a vote from members, but prior to a vote being held, the Singapore bid was withdrawn, leaving only the tentative bid from Hawaii.

All IST members should now work together to support Dr. Yanagihara and her colleagues in ensuring Hawaii can host a successful Congress, probably in 2012. The IST Council will need to work with our Hawaiian colleagues to determine the best time in 2012 to hold the Congress. We would welcome feedback from members on this, but initially sometime in June would seem suitable, because it would coincide with usually good weather, the end of teaching terms in the US and Europe, and would be close to holiday times for the Northern Hemisphere, allowing members to more easily schedule holidays with family, incorporating attendance at the Congress. We will be striving to ensure the Congress is affordable, including less expensive accommodation for student members. Because Hawaii is part of the US, members from some countries not covered by the US Visa-waiver program will need to organise visas well in advance. More on this as plans develop.

Organising an IST World Congress is not easy and requires a great deal of effort by local IST members. This work, on behalf of all of us, deserves to be valued by the membership and we should all see what we can do to assist the local organisers. It is particularly important to gain an idea of likely attendance to allow budget planning. Therefore, once plans are further advanced, we will ask all members to indicate if they definitely intend to attend the meeting, or will definitely not be coming. Once a Scientific Organising Committee is established for the Congress, input from members on possible meeting content will be sought.

For the present, members should communicate re the Congress via the Secretary IST (julian.white@adelaide.edu.au) and President (antgopal@nus.edu.sg).

NATURAL PEPTIDES TO DRUGS

4th International Congress

Improving on Nature or Relying on Nature?

Book the dates! **11 - 14 April 2010**

Zermatt, Switzerland

www.np2d.com

First Announcement

Following the success of the three editions held since 2002, we are glad to announce the organisation of the 4th NP2D congress at the foot of the majestic Matterhorn mountain, in Zermatt ! NP2D is not a conventional scientific conference. It aims at offering a fantastic experience bringing together high level science, fruitful interactions among the participants & exciting social activities, all in the warm and friendly atmosphere of the Swiss Alps.

Scope & Format

NP2D is an international, interdisciplinary exchange platform for specialists and decision makers involved in major overlapping areas of pharmaceutical peptides R&D such as: **peptide hormones**, **toxins, immunomodulators** and **antimicrobial peptides**.

The scope is meant to cover the whole spectrum **from discovery to market**: drug discovery, biomarkers, clinical trials, peptides in the food and cosmetic markets, delivery systems, peptide synthesis and manufacturing, funding strategies, regulatory issues, intellectual property, reaching the drug market.

The audience is strictly limited to **120 participants,** typically from more than **20 countries**, with a good balance between **academic and industrial** backgrounds, allowing for stimulating opportunities of interaction between academic and industrial research directors, development and production professionals from the pharma, biotech, food and cosmetic industry, service providers and CROs, suppliers of technology and instrumentation, as well as consultants and venture capitalists.

The Programme at a glance

The scientific programme is built around 10 plenary lectures, 20 oral presentations, hot-spot sessions (short 5 minute business & scientific oral presentations), and a round-table on **'Future Perspectives in Peptide R&D'**. Again we expect high level speakers from various origins and backgrounds.

Offering ample time for social activities, this 4th NP2D congress aims to continue promoting fruitful interactions among the participants and above all, long-lasting relationships.

Organisers

- **Organiser:** Reto Stöcklin.
- **Scientific Steering Committee:** Paul Alewood, Richard DiMarchi, Peter Hoffmann, John P. Mayer, George Miljanich, Les Miranda, Robin Offord, Michael Pennington & Timothy Wells.

Venue

Zermatt is at the foot of the majestic Matterhorn mountain in the Swiss Alps at an altitude of 1'620 m (5'315 ft). NP2D is offered as an attractive, all-included congress package at Zermatt's prestigious five-star Seiler Hotel Mont Cervin in the center of the village.

www.np2d.com

NATURAL PEPTIDES TO DRUGS

4th International Congress

NP 2D

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Agenda

Improving on Nature or Relying on Nature?

11 - 14 April 2010

Zermatt, Switzerland

	Sunday 11	Monday 12	Tuesday 13	Wednesday 14
Morning		Lectures	Lectures	Lectures & Roundtable
Midday		Lunch	Lunch	Farewell reception
Early afternoon	Registrations	Recreational activities	Free	
Late afternoon	Welcome drink	Lectures	Lectures	
Evening	Opening lectures	Lectures	Gala dinner	
	Swiss evening			

Sponsors

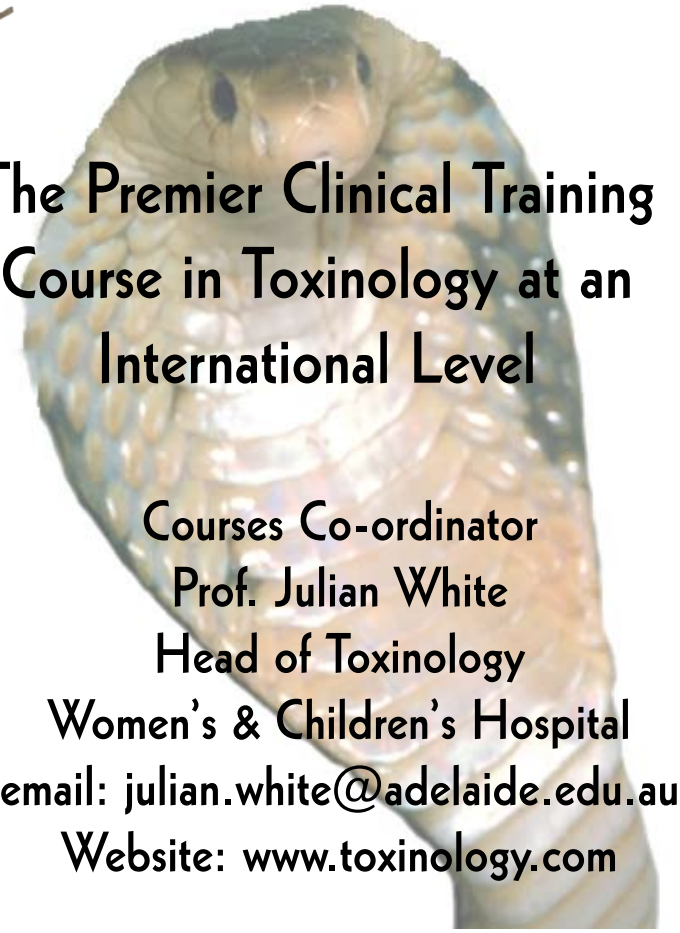
IST

NP2D 2008

University of Adelaide
Faculty of Health Sciences

CLINICAL TOXINOLOGY SHORT COURSE 2010

Women's & Children's Hospital
Adelaide, Australia
March 2nd to 7th
2010



The Premier Clinical Training Course in Toxinology at an International Level

Courses Co-ordinator
Prof. Julian White
Head of Toxinology
Women's & Children's Hospital
email: julian.white@adelaide.edu.au
Website: www.toxinology.com

IMPORTANT COURSE INFORMATION

COURSE RELATED QUESTIONS:

Who is this course designed for?

Primarily for doctors/health professionals requiring detailed and practical information on snakebite, spiderbite, scorpion stings, marine envenoming, poisonous plants & mushrooms and related topics with a global and Australian perspective. It is particularly relevant for those working in emergency medicine, toxicology, intensive care, or in rural practice. Throughout there will be an emphasis on practical clinical issues and development of clinically relevant skills. It will also be of interest to poisons information pharmacists and graduate nurses in emergency medicine and toxinology scientists. You should be fluent in English, as no language translation will be available.

When and where are the courses held?

The course runs over 6 days; Tuesday March 2nd to Sunday March 7th, 2010. The venue is the Women's and Children's Hospital, North Adelaide, SA, Australia

What does the course cover?

We cover terrestrial & marine animals, plants & mushrooms, including extensive seesions on venomous snakes by region. Detailed sheets on course content will be available on the web at http://www.toxinology.com.

Is the course accredited in any way?

The course is a University of Adelaide postgraduate training course. We are seeking formal accreditation of continuing education points with relevant colleges and possible incorporation within some college specialist training schemes.

How many people can attend the course?

The maximum course capacity is 50 registrants, to ensure a chance for interactions with faculty. Previous courses filled early, so early registration is advisable.

How much does the course cost and what does this cover?

The course costs Aus$2,000 (+GST for Australians only); the fee covers the full course, course notes, field trip, morning and afternoon teas and light lunches. It does not cover the course dinner or accommodation.

Are there any course notes or reading material available prior to the course?

We produce course notes for registrants prior to the course, which will include recommended textbooks and reading list. You are still strongly advised to take notes during all sessions. (The 2008 Course Handbook was 500 pages.)

What sort of practical clinical sessions are included?

The programme includes many interactive sessions discussing "clinical evolving problems" (CEPs) to develop registrant's understanding of clinical skills in toxinology and test those skills in a group setting. These are all based on real patients contributed by faculty members, drawn from their own clinical experience.

Is there any formal evaluation of my performance on the course?

Yes! Faculty will be evaluating all registrants on their interactions, especially during the clinical evolving problem sessions. On the Saturday there will be a written examination.

For further information check the Course pages on www.toxinology.com, or contact Prof. White (julian.white@adelaide.edu.au).

CLINICAL TOXINOLOGY SHORT COURSE 2010 - March 2nd to 7th, 2010

Please note: presenters listed for each lecture/CEP are as listed, but subject to change should circumstances require. VENUE is Queen Vic Lecture Theatre, except as otherwise noted.

(JW=JWhite; JP=JPChippaux; VW=VWilliams; BC=BCurrie; RD=Rick Dart; HP=HPersson; GI=GIsbister; BD=RDowset; TC=TChristensen; PA=PAplin; GN=GNewman-Martin; ML=MLittle; MH=MHutchinson; DH=DHirst; GC=GCoombe; HW=HuiWenFan; JD=Janaka DeSilva; AG=Aniruddha Ghose; ME=Michael Eddleston; SW=Scott Weinstein)

	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
0800 - 0900	0800 Registration 0830 Course Intro. JW 0845 World of Toxins SW	0800 0830 Asian snakes JD/AG	0800 0830 0845	0800 0815 Arthropods intro JW 0830 Scorpions JW/HW	0800 0830 Fish, anemones coral, etc GI	
0900 - 1000	0900 Neurotoxins JW 0915 Myotoxins JW 0930 Hemotoxins VW 0945 Necrotoxins HW	0915 CEP-snake AG/JD 0945 European snakes HP	0915 Plants-intro TC 0930 Plants-clinical intro HP/ME	0900 CEP-scorpion JP 0920 Funnel webs GI 0940 CEP-spider JW	0910 CEP-marine ML 0940 Sea snakes JW	0815 Board bus 0830 Trip to Venom Supplies to see exotic snakes *Bus departs 0830 Lunch at Jacobs Creek Winery Time permitting wine tasting available
1000 - 1100	1000 1030 Morning Tea	1000 CEP-snake HP 1030 Morning Tea	1015 CEP-plants PA 1030 Morning Tea	1000 Widow spiders GI/RD 1030 Morning Tea	1000 CEP-marine ML 1015 1030 Morning Tea	
1100 - 1200	1100 Antivenoms JW 1125 Treatment O'view JW 1145 First aid O'view BC	1100 Sth&C Am. snakes HW 1130 CEP-snake HW	1100 Contact dermatitis GN 1115 Cardiac glycosides ME 1130 CEP-plants HP 1145 Anticholinergic PA	1100 Loxoscelism HW 1115 CEP - spider GI 1135 Ticks JW 1150 Centipedes GI	1100 Octopus&fugu JW 1115 Cone shells JW 1130 CEP-marine ML 1150 Shellfish BD	
1200 - 1300	1200 Snakes O'view MH 1230 CEP Intro-snake ML	1200 LUNCH - Alan Crompton Rm 1230 GRAND ROUND African Snakes & global AV issue JP	1200 LUNCH - Rm 202 2nd floor SW Bldg 1230 Botanic Gardens walk TC/PA/HP/ME/RD	1205 CEP-arthropods GI 1220 Insects GI 1240 CEP-insect GI	1215 CEP-marine BD 1230 Ciguatera BD 1245 CEP-marine BD	
1300 - 1400	1300 LUNCH - Alan Crompton Rm Grnd floor SW Bldg	1300 1330 CEP-snake JP		1300 LUNCH - Alan Crompton Rm 1330 Practical Rm202 Marine + Arthropods DH/GI/JW/JS	1300 LUNCH - Alan Crompton Rm	
1400 - 1500	1400 Snakebite first aid BC 1430 Australian snakes JW	1400 Practical Rm202 2nd floor SW Bldg Snakes ID session & SVDK MH/JW/JP/BC/GI/CSL	1430 Cytotoxic/cyanogenic Oxalates PA 1500 CEP-plants ME/PA	1430 Marine O'view JS 1500 Marine venoms GI 1515 CEP-marine ML	1400 Panel Q&A session all 1430 EXAM all	
1500 - 1600	1530 Afternoon Tea	1530 Afternoon Tea	1530 Afternoon Tea	1530 Afternoon Tea	1530 Afternoon Tea	1530 Arrive back at hosp. Bus will then go to airport - those wishing to go to airport should bring all luggage etc in the morning to load on bus.
1600 - 1700	1600 CEP-snake JW 1630 Snakebite treatment issues JW	1600 Nth American snakes RD 1630 CEP-snake RD	1600 Mushrooms clinical HP	1600 J'fish-Chironex BC 1630 CEP-jellyfish BC 1650 J'fish-irukandji ML	1600 Safe snake handling GC 1640 Exam results & wind up all	
1700 - 1800	1700 1730 CEP-snake BC 1800 Close for day	1700 Registrant presentations 1800 Close for day	1715 CEP-mushroom HP 1800 Close for day	1700 CEP-jellyfish ML 1720 J'fish-other GI 1740 CEP-jellyfish GI 1800 Close for day	1700 Course concludes (optional field trip on Sunday is highly recommended)	

University of Adelaide and the Women's & Children's Hospital

CLINICAL TOXINOLOGY SHORT COURSE

ENROLMENT FORM & TAX INVOICE

First Name: ..... Last Name: ..... Title: ..... (Dr., Prof. etc)

Qualifications: .....

Institution: .....

Postal Address: .....

Suburb/City: ..... Postcode: .....

Country: .....

Telephone: ..... Fax: .....

Mobile phone: .....

Email: .....

Clinical experience with cases of envenoming?:

.....

Arrival Date: ..... Departure Date: .....

What accommodation have you arranged?: .....

Have you checked to see if you need a VISA to enter Australia?: .....

PAYMENT DETAILS & TAX INVOICE

Women's & Children's Hospital
ABN 609 832 74825

Payment must be received by January 1st, 2010, to ensure enrolment.
Full International Clinical Toxinology Short Course (includes plants & mushrooms)
(incorporates all elements of previous Australian courses; no separate Australian course will be offered in 2010)

March 2nd to 7th, 2010 Aus$2,000.00 *+GST of Aus$200 if from Australia ☐

PLEASE NOTE: If insufficient numbers enrol for the Course, the Course may be cancelled, in which case full refund of Course fees will be made. Course organisers do not accept responsibility for any other costs incurred by registrants, should the Course be cancelled. Course fees for 2010 have not increased since 2008 and cover costs incurred in staging the Course.

Payment by Bankers Cheque to "TOXINOLOGY COURSE WCH"
Mail to: Toxinology Dept, Women's & Children's Hospital, North Adelaide SA 5006 AUSTRALIA
Fax: ++61-8-81618024 Email: julian.white@adelaide.edu.au

Payment by Credit Card: Please debit my: VISA Mastercard AMEX for Aus$.....
Card Number: ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Expiry Date: ...../..... Name on Card: ..... Signature: .....

LES ANIMAUX VENIMEUX ET VÉNÉNEUX

Systématique, biologie, toxicologie

Année 2009 - 2010

MODULE I - **Responsables : Max Goyffon et Michel Thireau**

Venimologie générale - Vertébrés terrestres

Lundi 18 janvier - Vendredi 22 janvier 2010

Lundi 18 janvier 2010
09h00 - 09h15 : **Accueil**
09h15 - 10h45 : **La fonction venimeuse**
C. Rollard, Muséum
11h00 - 12h15 : **Toxicité aiguë des venins et neutralisation par les antivenins**
J.-P. Chippaux, IRD, Paris
14h00 - 15h15 : **Venins : génomique, protéomique et bio-informatique**
R. Stöcklin, Atheris, Genève
15h30 - 17h30 : **Les amphibiens**
J. Lescure, Muséum

Mardi 19 janvier 2010
09h00 - 10h45 : **Les serpents : anatomie de l'appareil venimeux**
J.-P. Gasc, Muséum
11h00 - 12h00 : **Visite du vivarium de la ménagerie ou films sur les serpents**
14h00 - 15h00 : **Visite du vivarium de la ménagerie ou films sur les serpents**
15h30 - 17h00 : **Les serpents : systématique moléculaire**
N. Vidal, Muséum

Mercredi 20 janvier 2010
09h00 - 11h30 : **Biologie, comportements des serpents**
X. Bonnet, CNRS, Villiers-en-Bois
14h00 - 16h15 : **Composition et mode d'action des venins de serpents Viperidae**
F. Dorandeu, CRSSA, Grenoble
16h30 - 17h30 : **Les mammifères venimeux et les oiseaux vénéneux**
J.-L. Berthier, Muséum

Jeudi 21 janvier 2010
09h00 - 10h30 : **Composition générale et mode d'action des venins de serpents Elapidae**
D. Servent, CEA
10h45 - 12h15 : **Immunothérapie des envenimations ophidiennes**
M. Sorkine, clinique du Val d'Yerres, Yerres
14h00 - 16h30 : **Épidémiologie et clinique des envenimations ophidiennes**
J.-P. Chippaux, IRD, Paris

Vendredi 22 janvier 2010
09h00 - 10h15 : **Inhibiteurs naturels des PLA_2. Résistance naturelle aux venins**
G. Faure, Institut Pasteur, Paris
10h30 - 12h15 : **Les Atractaspididae : biologie et venins**
F. Ducancel, CEA
14h15 - 15h30 : **Anticorps recombinants neutralisants**
P. Billiald, Muséum et Tours
15h45 - 17h00 : **Synthèse et conclusion**
J.-P. Chippaux, IRD, Paris

MODULE II - **Responsables : Christine Rollard et Max Goyffon**

Arthropodes terrestres - Parasites

Lundi 15 mars - Vendredi 19 mars 2010

Lundi 15 mars 2010
09h00 - 09h15 : **Accueil**
09h30 - 10h30 : **Présentation des arthropodes**
C. Rollard, Muséum
10h45 - 12h15 : **Venins d'arthropodes et spectrométrie de masse**
C. Guette, Angers
14h00 - 16h30 : **Les insectes hyménoptères**
J. Weulersse, Muséum
16h45 - 17h30 : **Les venins d'hyménoptères**
M. Goyffon, Muséum

Mardi 16 mars 2010
09h00 - 12h15 : **Les insectes piqueurs autres que les hyménoptères**
P. Bourdeau, ENV, Nantes
14h00 - 15h30 : **Les protistes. Les vers parasites. Effets venimeux**
P. Bourdeau, ENV, Nantes
15h45 - 17h15 : **Composition et activités biologiques de la salive des diptères**
V. Choumet, Institut Pasteur, Paris

Mercredi 17 mars 2010
09h00 - 12h30 : **Les myriapodes : systématique, biologie et fonction venimeuse**
J.-J. Geoffroy, CNRS et Muséum
14h00 - 16h15 : **Les acariens : biologie et fonction venimeuse**
R. Chermette, ENV, Maisons-Alfort
16h30 - 17h30 : **Les acariens : systématique**
Y. Coineau, Muséum

Jeudi 18 mars 2010
09h00 - 12h30 : **Les araignées : systématique, biologie, répartition, espèces dangereuses**
M.-L. Célérier et C. Rollard, Muséum
14h00 - 15h15 : **Venins d'araignées et canaux ioniques**
S. Diochot, CNRS, Sophia Antipolis
15h30 - 17h45 : **Les scorpions : systématique, biologie, répartition**
R. Stockmann, Paris

Vendredi 19 mars 2010
09h00 - 12h00 : **Les venins de scorpions**
C. Legros, Angers
14h00 - 16h15 : **Aranéisme - Scorpionisme**
M. Goyffon, Muséum

MODULE III - **Responsables : Christine Rollard et Nadia Améziane**

Faune marine - Écosystèmes marins

Lundi 17 mai - Vendredi 21 mai 2010

Lundi 17 mai 2010
09h00 - 10h30 : **Panorama de la faune venimeuse et vénéneuse de la mer Méditerranée**
S. Baghdiguian, Montpellier
10h45 - 12h00 : **L'électrophysiologie comme méthode d'étude des biotoxines d'origine marine**
C. Mattei, DGA
14h00 - 17h00 : **Les cnidaires**
M. Guillaume, Muséum

Mardi 18 mai 2010
09h00 - 10h30 : **Les mollusques**
P. Favreau, Atheris, Genève
10h45 - 12h30 : **Venins de cônes : diversité de leurs peptides et cibles moléculaires**
J. Molgo, CNRS, Gif-Sur-Yvette
14h00 - 15h45 : **Les mollusques bivalves toxiques**
P. Lassus, IFREMER, Nantes
16h00 - 17h00 : **Les annélides**
T. Meziane, Muséum

Mercredi 19 mai 2010
09h00 - 12h00 : **Les poissons venimeux**
F. Goudey-Perrière, UFR Pharmacie, Châtenay-Malabry
14h00 - 15h30 : **Les poissons venimeux** (suite)
F. Goudey-Perrière, UFR Pharmacie, Châtenay-Malabry
15h45 - 17h00 : **Les bryozoaires**
J.-L. d'Hondt, Muséum

Jeudi 20 mai 2010
09h00 - 11h00 : **Les éponges et les ascidies**
M.-L. Bourguet-Kondracki, Muséum
11h15 - 12h45 : **Les échinodermes**
N. Améziane, Muséum
14h00 - 17h00 : **Ichtyotoxines. Toxines ciguatériques et ciguatera**
P. Bourdeau, ENV, Nantes

Vendredi 21 mai 2010
09h00 - 09h45 : **Intoxications par consommation de chair de tortues marines**
J. Lescure, Muséum
10h00 - 12h00 : **Les serpents marins** (cours suivi d'un film)
I. Ineich, Muséum
14h00 - 16h00 : **Les serpents marins** (suite)
I. Ineich, Muséum

Renseignements, inscriptions et coordination :

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chroll@mnhn.fr

Institut de recherche pour le développement

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Welcome / Bem-vindos / Bienvenidos

You are most welcome to join the 10th Meeting of the Pan American Section of the International Society on Toxinology (IST) in San José, Costa Rica.

This meeting will allow both basic and clinical researchers to exchange their knowledge and expertise on toxins derived from animals, plants and microorganisms.

Contributions on the molecular, biochemical, pharmacological, toxicological and immunological properties of toxins are welcomed.

The meeting will take place from April 18th to April 22nd, 2010, at the Hotel Real Intercontinental, in San José,Costa Rica, at the heart of Central America.

Costa Rica is well known for its beautiful landscapes, cool volcanoes, warm beaches and amazing biodiversity.

This meeting will provide you with an excellent opportunity for scientific and social interaction. Don't miss it...

We look forward to welcoming you in San José!

With warmest regards,
Organizing Commitee

Message from
Dr. P. Gopalakrishnakone
President of The IST

ICP Instituto Clodomiro Picado

ICT Instituto Costarricense de Turismo

Photo Gallery

Toxinology in Poland

Maria Stankiewicz[1], Leszek Satora [2], Grzegorz Porowiñski[3]

1. Department of Biophysics, Institute of General and Molecular Biology, N. Copernicus University, Torun, Poland
2. Poison Information Centre of Collegium Medicum, Jagiellonian University, Krakow, Poland
3. Representative of Polish breeders of venomous animals; manager of website in Polish jadowite.org ("jadowite" - in English: venomous)- with professional information concerning venomous animals.

Poland is a country in the Central Europe, with temperate climate, known as rather cold region. In such environmental conditions the variety of venomous animals is very poor. Only one snake (European viper – Vipera berus) represents a real danger for human health or even life. Furthermore, allergic reactions induced by stings of bees, wasps can create a greater risk for highly sensitive persons. Such situation can induce the impression that there is no problem with the envenomation in Poland. However, the reality is quite different. Many people like to enrich their life by breeding different venomous animals as scorpions, spiders, venomous fishes and first of all snakes. Some of them are experts, others are unconscious of possible accidents. Private rearing is generally forbidden. Venomous animals can be grown only in zoological gardens, research laboratories and circus, however there is no official list of such animals. It should appear 1 January 2010. What it will happen after with all venomous, exotic animals living in private houses? The best solution would be the licences assigned only to breeders after special exams. This is the opinion of serious owners of venomous animals. What our Ministry of Environment will decide finally ?... Nobody knows. Independently from the official organization of dangerous creature problems, every month patients injured by their "pets" are coming to hospitals. The most often, accidents with beautiful pterois fishes and snakes are concerned. Additionally, many cases of envenomation are unknown. The "victims" afraid of consequences of illegal venomous animals breeding and they prefer to stay at home using Calcium and analgesics as antidote. There are 4 Centres of Toxicological Information in Poland. They coordinate and drive the medical help in case of unusual poisoning or envenomation. However, often, medical care is limited because of lack of suitable antibodies.

In described conditions, the idea of formation of toxinological section in Polish Toxicological Society is developing. Initiative is coming from Poison Information Centre of Collegium Medicum in Jagiellonian University, Krakow and other Toxicological Centres (in Gdansk, Poznan and Warsaw), from Polish National Consultant in Toxicology, from specialists in breeding of venomous animals and from toxinological research laboratory at Nicolaus Copernicus University in Torun. A first, small toxinological meeting took place in Toruñ in 2001 during the Congress of Polish Neuroscience Society. A second one occurred in September this year, as a session during the Polish Conference of Clinical Toxicologists not far from the east border of Poland. Subjects of presentations were: "Scorpion venom – mechanisms of action"; "Venomous snakes reared in Poland"; "Risk coming from venomous snakes reared at houses"; "Envenomations by vipera"; "Venomous spiders reared in Poland"; "Examples of envenomation by spiders in Poland"; "Risk coming from lionfishes"; "Regulation of law concerning venomous animals in Poland". Next meeting is planned in February, again in Torun. In this town, in the Institute of General and Molecular Biology N. Copernicus University, the electrophysiological laboratory (in Department of Biophysics) is specialized in toxico/toxino-logical studies. Different electrophysiological techniques on insect preparations are used. The activity of this laboratory was developed with the initiative and the great help of known French toxinologist Prof. Marcel Pelhate and his colleagues from "Laboratoire de Neurophysiologie" of Angers University in France. At present, Prof. Marcel Pelhate is retired but always we can count on his cooperation and the collaboration with his Laboratory (now "Laboratoire: Recepteurs et Canaux Ioniques Membranaires") is very active. Rich, precious and helping collaboration also with many other toxico-toxinological laboratories namely from France, Israel, Brazil, Mexico, Germany, Australia permitted us to enter in the international, wonderful "Toxinological World". We hope that time comes for further development of toxinology in Poland and we count on the support from International Society on Toxinology.

www.newsobserver.com/life

One bite costs $79,000

The copperhead was coiled on the walkway right in front of Carl Forsyth as he stepped out the back door. But it was dusk, and Forsyth was on the phone.

At first he didn't know what hit him. Weeks later, he had a similar reaction to the bill.

The snakebite occurred in late August, the night before the new school year was to begin. Forsyth – co-principal of Voyager Academy, a charter school in Durham – was reading the newspaper when he got a phone call from another school leader. They were engrossed in a discussion of some last-minute, school-opening details when Forsyth felt the explosion of pain in his foot.

Ruth Sheehan

Then he saw the snake, with its distinctive markings. Venomous. He knew he'd better get off the phone and call 911.

As he waited for the ambulance, his leg began to swell.

When Forsyth got to Duke University Medical Center, the doctor first tried to bring down the inflammation with Benadryl. But within a few hours, Forsyth's foot was so swollen it was almost unrecognizable. The swelling had also continued to move up his leg.

"When it got to my knee, the doctor asked if I wanted to try antivenom," Forsyth said. "They told me it was going to be expensive."

At that moment, of course, Forsyth wasn't in the mood to ask what that meant.

Forsyth

The antivenom treatments, three in all, worked wonders.

"They warned me at the time that some people, even with the antivenom, end up losing tissue or losing part of the function of their foot or leg," he said.

Forsyth was lucky.

He spent several days flat on his back and then gradually graduated from crutches to a cane. It took six weeks, but he regained full use of the leg.

Then he received the statement from Duke for his brief adventure in the ER.

For the 24-hour stay, the total was $79,000, the lion's share of it for the antivenom.

Forsyth was stunned.

Not that he wasn't impressed with the care he received at Duke. He was.

Not that he was particularly concerned for himself. He wasn't. Forsyth has good insurance. In the end, his share was several thousand bucks.

"I can afford it," he said.

But Forsyth, ever the educator, was struck by what a bill like this – from one fluky, painful encounter with a copperhead – would mean for a person without resources. Worse yet, for a person without insurance.

You have to wonder, Forsyth said, would a person with no insurance receive the costly antivenom?

Duke's emergency room chief says yes.

"The Duke emergency department evaluates, treats and cares for patients irrespective of their ability to pay. Our faculty and staff do not know patients' insurance status when they are here for treatment," said Dr. Michael Hocker of the division of emergency medicine.

But to Forsyth, the $79,000 bill is a stark reminder of what's at risk in the national health care debate. He said it would have wiped out his own kids, who are grown.

"Seems to me we need to remember how much people have at stake," he said. "There has been so much ugly talk back and forth."

The question is: What's the antidote for that?

ruth.sheehan@newsobserver.com or 919-829-4828

EFATH2009 Meeting Report

The 4th International Conference on Exogenous Factors Affecting Thrombosis and Haemostasis was held at the Campus Center at the University of Massachusetts - Boston, USA from July 17-19, 2009. Themed "From Genomes to Proteomes to the Clinic", the seminars covered the most current discoveries on coagulation-related venoms from multiple species. Frank Markland (USA) started the first evening with an opening address on "Perspectives on Venom Research from the Past Quarter Century". That evening was also marked by the emergency room visit of organizer Mary Ann McLane (USA) to address a sudden onset of double vision! Many thanks to Dr. Kini who accompanied her on that long night and then stepped in as organizer of Saturday's activities at the meeting venue. While there was relief that neither stroke nor tumor were involved, Mary Ann left Boston still seeing double, and the situation did not resolve itself until mid-August, with the cause never identified. Mary Ann is very grateful for all the support and compassion shown to her by these international colleagues over those 2.5 days and afterward!

Saturday's discussions began with Jan Rosing (Netherlands) giving an overview of snake venom prothrombin activators and Md Abu Reza (Singapore) describing the origin and evolution of the prothrombin activator trocarin D (*Tropidechis carinatus*) from duplication of coagulation FX gene of the snake and subsequent recruitment into the venom gland by a simple insertion of a 264 bp sequence (VERSE) in its promoter region. Takashui Morita (Japan) contrasted the similarities and diversity of snake venom vascular endothelial growth factors (VEGF-Fs). Linda Carrijo-Carvalho (Brazil) reported on cell viability assays using peptides derived from the primary structure of the serine protease, Lopap, from the bristles of the *Lonomia obilqua* caterpillar. Two peptides showed antiapoptotic activity but, interestingly, no procoagulant activity. A focused session on genomics and proteomics included Ivo Francischetti (USA) on the salivary gland from blood sucking arthropods; Juan Calvete (Spain) on the links between proteomic analysis of toxin composition and the immunological profiles of venoms; Ana Marisa Chudzinski-Tavassi (Brazil) on a peptide derived from a transcriptomic library of the *Lonomia obilqua* caterpillar, which induces synthesis of extracellular matrix molecules by fibroblasts in culture and in mouse dermis in vivo; and Jay Fox (USA), on the direct and indirect effects of venoms and their toxins on host gene expression profiles.

Saturday afternoon's discussions began with two examples of the movement of venom research to clinical trials. Wolfgang Sohngen (Germany) summarized the journey of desmoteplase, from the vampire bat *Desmodus rotundus*, for the treatment of stroke. Frank Markland (USA) shared the "Long and Winding Road" of recombinant alfimeprase (from fibrolase in *Agkistrodon contortrix* contortrix) from the 1990s to 2008, in the disappointing attempts to show its effectiveness for peripheral arterial occlusion. Luciana Wermelinger (Brazil) reported on a molecular modeling approach to study the requirement for RGD in *Bothrops jararaca* disintegrin and cyclic peptide interactions with the αIIbβ3 crystal structure. Two final sessions focused on antivenom effectiveness. Ponlapat Rojnucharin (Thailand) shared studies on the challenges of using poly-specific antibodies to treat snakebite, including inability to treat local injury, complement activation by immunoglobulin Fc domains and the need to have the venom be tailor-made for geographic variations of snake toxins. Elda Sanchez (USA) shared the 21st century challenges with pharmaceutical companies halting production of antivenoms due to low profit and stringent safety regulations, and alternative methods for developing new and improved antivenoms. A wonderful dinner in the Wine Cellar at Legal Seafoods rounded out the day.

Sunday's presentations included Bernard Le Bonniec (France), who summarized five types of plasminogen activators, of which two types have been isolated from the venoms of the bat *Desmodus rotundus* and from four snake species (*Trimeresurus stejnegeri, Lachesis muta muta, Agkistrodon halys brevicaudus* and *Agkistrodon blomhoffi ussurensis*). Maria Kazimirova (Slovakia) reported on pharmacologically active compounds in soft and hard ticks, including a direct thrombin inhibitor, variegin, from *Amblyomma variegatum*. Manjunatha Kini (Singapore) shared the three-dimensional

structure of the variegin-thrombin complex by x-ray crystallography at 2.7 Å, and the favorable comparison of its activity to that of the FDA-approved bivalent thrombin inhibitor bivalirudin. Russolina Zingali (Brazil) illustrated the activities of venom-derived thrombin and prothrombin inhibitors in two animal models of venous thrombosis and pulmonary thromboembolism. Juan Calvete (Spain) summarized an evolutionary theory for the structural variety of venom disintegrins, and the unique RTS motif found in jerdostatin (*Trimeresurus jerdonii*). Ana Moura da Silva (Brazil) reported on the role of collagen-binding in the hemorrhage induced by snake venom metalloproteinases. Steven Swenson (USA) provided insights into venom-derived and recombinant disintegrins as effective anti-tumor and anti-angiogenic agents. Kenneth Clemetson (Switzerland) raised interesting questions about the structure of snake C-type lectins (snaclecs) and their ability to be active at picomolar concentrations.

The final afternoon's sessions included talks on venom-derived phospholipases by Grayzna Faure (France) (*Vipera ammodytes ammodytes, Crotalus durissus terrificus*) and Juri Siigur (Estonia) (Vipera lebetina); bifunctional kallikrein-like enzymes from the venom of *Sistrurus catenatus edwardsii* by Steven Mackessy (USA); development of bifunctional disintegrins for detecting and studying integrins by Diego Butera (Australia); bradykinin potentiating peptides from *Bothrops* snake venoms by Anna Perchuc (Germany); and a biologically active peptide, vasotab, from the horse fly *Hybomitra bimaculata* by Peter Takac (Slovak Republic).

By all accounts, the 2.5 days were successful in providing a cutting edge focus on venom agents affecting the coagulation system in an environment that was conducive to discussion, networking and scientific camaraderie. The organizers are very grateful to Venom Supplies, Tanunda South Australia, for its support of this meeting. The information from this meeting will be available in a book to be published by Springer in 2010: Toxins and Hemostasis: From Bench to Bedside.

High Sensitive Detection of Microcystins (MCs) and Okadaic acids (OAs) by Recombinant Proptein Phosphatase 2A (PP2A) Inhibition

Tsuyoshi Ikehara[1] & Takeshi Yasumoto[2]
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2Okinawa Science and Technology Promotion Center, 12-75 Suzaki, Uruma, Okinawa 904-2234, Japan (E-mail:yasumotot@subtropics.or.jp)

The rapid assay kits for microcystins (MCs) and okadaic acids (OAs), based on inhibition of the critical enzyme protein phosphatase 2A (PP2A), were developed by Tropical Technology Center (TTC) in Okinawa, Japan. In terms of the chemical and instrumental analysis, the PP2A assay is faster, simpler, cheaper, and better suited for handling large numbers of samples. The Kits are now undergoing single-laboratory validation (SLV).

MCs Rapid Kit for detection of Microcystins in environment water

Worldwide blooms of toxic cyanobacteria (blue-green algae) commonly occur in freshwater and brackish water. The toxic cyanobacteria produce microcystins (MCs) and nodularin. The latter is included in MCs. An important aspect of the MCs is related to human health. The deaths of more than 50 hemodialysis patients in Caruaru, Brazil, were linked to the presence of MCs in water (Jochimsen et al., 1998; Pouria et al., 1998). Accordingly, the World Health Organization (WHO) has recommended a guideline imposing a maximum allowable level of 1 µg/L microcystin-LR or its equivalent in water. Therefore, a good analytical tool is required to implement monitoring of microcystins.

The reversible protein phosphorylation controlled by protein kinases and phosphatases is a major regulation mechanism in all eukaryotic cells. The protein phosphatases are classified into the two classes of the serine/threonine phosphatases and the tyrosine phosphatases. Protein phosphatase 2A (PP2A) is one of the serine/threonine phosphatases. PP2A consists of a catalytic subunit (c subunit), a structural subunit (A subunit) and a regulatory subunit (B subunit). Microcystins (MCs) which are cyclic heptapeptide hepatotoxins produced by cyanobacteria, and okadaic acid (OA) responsible for diarrhetic shellfish poisoning (DSP), inhibit PP2A strongly and specifically. PP2A can hydrolyze a colorless artificial substrate, p-NPP, and produces the yellow color of p-NP (Fig. 1). The intensity of the color is proportional to the enzyme activity and the absorbance is measured at 405nm. The concentration of these toxins in samples is calculated from the standard curve prepared using known concentrations of the toxins. Previously, colorimetric PP2A inhibition assays for microcystins used native PP2A extracted from human hepatocytes, human red blood cells, or rabbit skeletal muscle. However, assay methods employing native PP2A have not been widely used because of fluctuations in enzyme quality. Thus, it is crucial to have a PP2A product of high purity and good stability to put a PP2A assay into practical use.

Recently, our group produced biologically active recombinant PP2A using a baculovirus expression system (Ikehara et al., 2006), and evaluated the suitability of the rPP2Ac for use in a microplate MC assay (Ikehara et al., 2008). The recombinant PP2A catalytic subunit (rPP2Ac) could be purified in a simple step with good reproducibility (Fig.2). Using the rPP2Ac and pNPP as a substrate, we have developed the assay kit for rapid detection of MCs (Fig 3). The limit of detection (LOD) and quantitation (LOQ) for water samples was 0.021ng/ml and 0.04ng/ml, respectively. The LOQ value is well below the WHO recommended level, 1µg/L. These results indicate that the MCs Rapid kit can assay MCs without a pre-concentration step of water samples whose concentrations are below the WHO recommendation (1µg/L).

DSP Rapid Kit for detection of okadaic acids in the shellfish

Diarrhetic shellfish poisoning (DSP) refers to a gastrointestinal disease following the ingestion of bivalve shellfish containing dinoflagellate toxins of lipophilic nature collectively referred to as the okadaic acids (OAs): OA, dinophysistoxin-1 (DTX1= 35-R-methyl OA), dinophysistoxin-2 (DTX2 =

31-demethyl-35-S-methyl OA), and their 7-O-acyl esters. DSP has been observed worldwide, and has posed a serious problem to both public health and the shellfish industry. To detect OAs, the DSP Rapid Kit was developed using the rPP2Ac (Fig 4). The assay is very sensitive, fast, easy, accurate and reproducible to detect OAs in the shellfish. The limit of detection (LOD) and quantitation (LOQ) for OA in shellfish are well below the regulation level proposed by EU (0.16 µg/g whole meat). For more information on the DSP Rapid Kit, please contact TTC web site (www.ttc.co.jp/dsp/).

The kits indicate that the rPP2A is an excellent tool for detecting and quantifying MCs and OAs. The kits are undergoing SLV, and then will subject to a collaborative validation in the Official methodsSM or Performance-Tested MethodsSM program of AOAC International.

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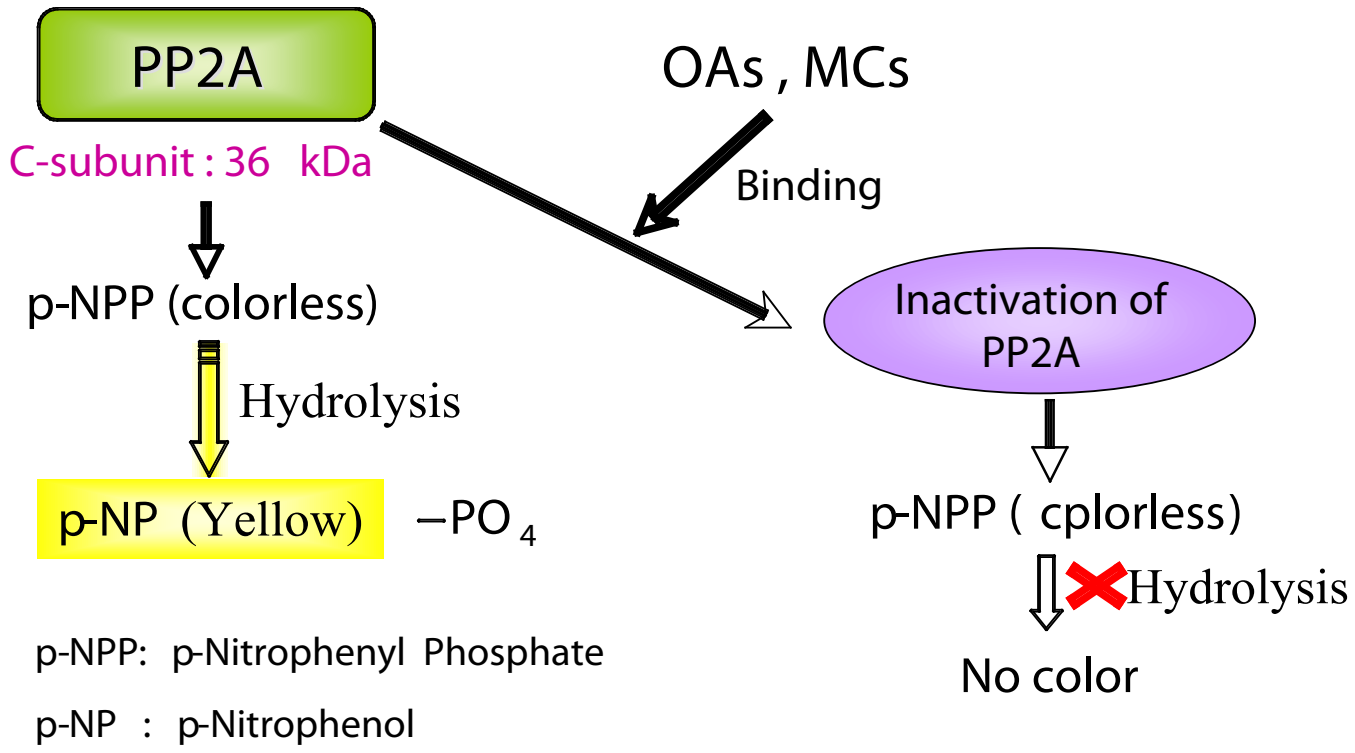

Figure 1: Assay Principle

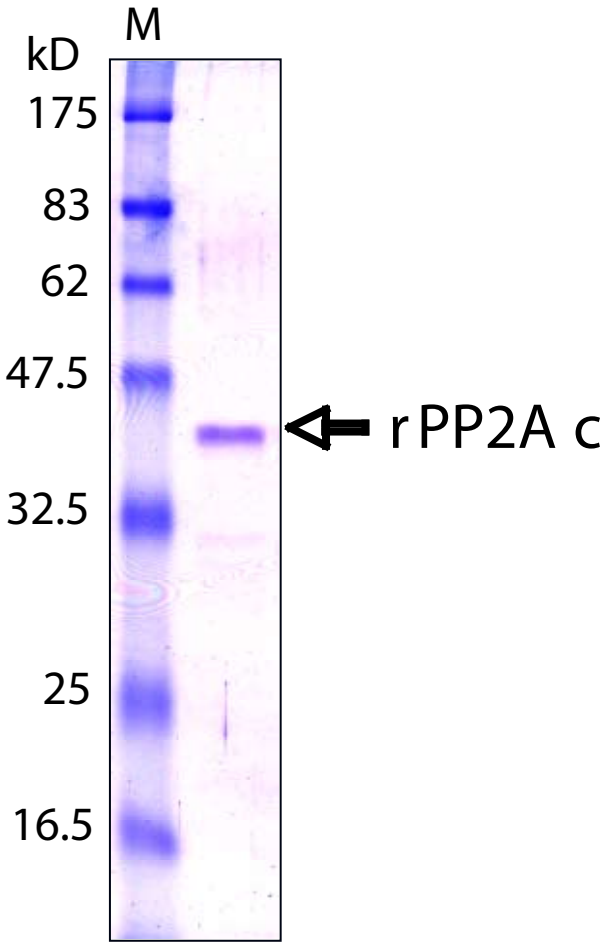

Figure 2: SDS-PAGE analysis of purified rPP2Ac

Figure 3: MC Rapid Kit

Figure 4: DSP Rapid Kit

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Comparative structural studies of two natural isoforms of ammodytoxin, phospholipases A_2 from *Vipera ammodytes ammodytes* which differ in neurotoxicity and anticoagulant activity ☆

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ABSTRACT

Ammodytoxin A (AtxA) and its natural isoform AtxC from the venom of *Vipera ammodytes ammodytes* belong to group IIA-secreted phospholipases A_2 which catalyze the hydrolysis of glycerophospholipids and exhibit strong neurotoxic and anticoagulant effects. The two isoforms, which differ in sequence by only two amino acid residues (Phe124 > Ile and Lys128 > Glu), display significant differences in toxicity and anticoagulant properties and act on protein targets including neurotoxic proteic receptors and coagulation factor Xa with significantly different strengths of binding.

In order to characterize the structural basis of these functional differences, we have determined the crystal structures of the two isoforms. Comparison of the structures shows that the mutation Lys128 > Glu in AtxC could perturb interactions with FXa, resulting in lower anticoagulant activity, since the side chain of Glu128 is partly buried, making a stabilizing hydrogen bond with the main-chain nitrogen atom of residue Thr35. This interaction leads to a displacement of the main polypeptide chain at positions 127 and 128 (identified by mutagenesis as important for interaction with FXa), and a different orientation of the side chain of unmutated Lys127. The mutation Phe124 > Ile in AtxC induces no significant conformational changes, suggesting that the differences in toxicity of the two isoforms are due essentially to differences in surface complementarity in the interaction of the toxin with the neurotoxic protein receptor. The crystal structures also reveal a novel dimeric quaternary association involving significant hydrophobic interactions between the N-terminal α-helices of two molecules of ammodytoxin related by crystallographic symmetry. Interactions at the dimer interface include important contributions from Met7, which is unique to ammodytoxin. Equilibrium sedimentation experiments are consistent with the crystallographic model.

Competition experiments using SPR technology show complete inhibition of AtxA binding to FXa by calmodulin (CaM). The crystal structure shows that the C-terminal region, important for binding to FXa and CaM, is fully exposed and accessible for interaction with proteic receptors in both the monomeric and dimeric forms of ammodytoxin described here.

The Italian initiative for marine biotoxin

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The outbreaks of human intoxication due to the ingestion of seafood contaminated by marine biotoxins has been often recorded in Italy, where the first cases due to molluscs contaminated by toxic algae have been recorded in 1989, and consisted of diarrhetic shellfish poisoning (1). During the last twenty years the types and distributions of algal biotoxins in Italian seas have undergone a notable evolution, comprising the mitigation of dinophysistoxin contaminations, and the appearance of yessotoxins in mussels in coastal areas of the Northern Adriatic Sea. Furthermore, the last ten years have been marked by an increasing reporting of mussel contamination by spirolides, as well as by toxic outbreaks that had not been recorded in Italian coastal waters in the past, involving blooms of *Ostreopsis* algae, that are producers of palytoxins (2). The evolution of the phenomenon has not only involved the changes in chemical classes of different toxins, but has included a significant change in the coastal areas touched by the toxicities in Italy. In the past, toxin outbreaks have been mostly localized in the northern Adriatic Sea (1). The *Ostreopsis* blooms, in turn, have been originally recorded along the coasts of Tuscany and Apulia, but have eventually moved northbound in the Adriatic Sea, up to Friuli Venezia Giulia, and have spread in the Tyrrhenian Sea, from Sicily to Liguria (3-9).

The *Ostreopsis* blooms in Italian seas have caused relevant fleeting alterations in water quality and colour, in benthic assemblages, and have been also suspected to contribute to death of benthic invertebrates, particularly when high temperatures have characterized the coastal waters where algal blooms were taking place (4,10). Furthermore, *Ostreopsis* blooms have been accompanied by many cases of severe human intoxications (3,4,10,11). Since these toxic episodes involved people that had been spending some time by the seashore during *Ostreopsis* blooms, it is believed that these toxic algae represent the causative agent of those intoxications (3,4,10,11). Marine aerosols contaminated with palytoxins have been considered as the most plausible origin of those intoxications, although the specific cause and the route of entrance of the toxic agent(s) into affected people have not been defined with certainty, yet.

A wide research effort has been developed in the last years in Italy, through the networking of many groups, leading to an integrated initiative by a partnership gathering investigators with distinct, but complementary, scientific and technical expertises, that have been carrying out several research projects devoted to specific issues related to marine biotoxins.

Framed by the Italian programme to support research projects of national relevance, that is being run by the Italian Ministry of University and Research, a research project entitled “Marine biotoxins in Italian coastal waters: characteristics, origin, actions“ has been selected among those approved for the call “PRIN 2007” (grant 2007FXSCL2). This project is a continuation of a long-standing effort devoted to marine biotoxins that has been continuously supported by the Italian MIUR since 2000, and is being coordinated by Gian Paolo Rossini (Università di Modena e Reggio Emilia).

The partnership of this project includes teams with specific expertise in the areas of algal biology, physiology and genetics (led by Rossella Pistocchi and Antonella Penna); toxin chemistry (Patrizia Ciminiello and Ernesto Fattorusso); ecology (Riccardo Cattaneo-Vietti and Cecilia Totti); biochemistry and physiology (Gian Paolo Rossini and Albertino Bigiani) and toxicology (Aurelia Tubaro). The partnership was also integrated by external collaborations with Centro Ricerche Marine (National Laboratory for Marine Biotoxin of the EC, Cesenatico, Italy), the Laboratory of Marine Biology of Bari (Italy) and the Regional Agency for Environmental Protection (ARPA) of the Liguria and Lazio Regions (Italy).

The general objective set for this research project was to obtain information on characteristics and actions of algal biotoxins existing in Italian coastal waters, as well as on the algae responsible for their production, leading to a better understanding of the phenomenon as a whole and, hence, providing the rational basis for a better informed assessment and a more effective management of the risks posed by marine biotoxins in Italy.

The research activities of the project have been devoted primarily to algae of the genus *Ostreopsis* and the biotoxins they produce, i.e., palytoxin and its analogues. Research activities on other marine biotoxins, having some impact in Italy, such as the spirolides, okadaic acid and yessotoxins, have also been included in the project.

Tasks could be grouped into five thematic areas: 1) the biology of several species of toxic algae, with particular attention onto the phylogeny, taxonomic characterization and identification of species of the genus *Ostreopsis* by molecular analyses; 2) the dynamics of *Ostreopsis* blooms, toxin production and their relationships with environmental factors; 3) the chemistry of marine biotoxins, with the isolation and characterization of toxins produced by *Ostreopsis ovata* and of other biotoxins that have been recently detected in Italian coastal waters; 4) the molecular mechanisms of action of palytoxins, with a focus onto ion fluxes (sodium, potassium) in excitable cells and the identification of toxin-specific biomarkers in non excitable cells; 5) the toxicity of algal toxins in animal systems, giving particular attention to the effects of palytoxins on species at distinct evolutionary levels, comprising gastropods, crustaceans, echinoderms, fish and mammals (mouse).

The overall structure of this project, including the five thematic priorities and the major links between tasks and groups, is indicated in figure 1, where the parts of individual thematic areas are framed by a dashed ellipsis, that points out the integration of their scientific contents.

The project is in an advanced phase of its development, and the major results obtained during its first year of activities on *Ostreopsis* algae and palytoxins include:

- The taxonomical characterization of *Ostreopsis* spp. by the analysis of DNA markers, showing that *O. siamensis* is limited to the Mediterranean areas, whereas O. ovata, that is the major producer of palytoxin-group toxins found in Italian waters, is more wide-spread and structured into different geographical populations (12,13).
- Proof that the *O. ovata* strains isolated from Italian coastal waters produce about ten-fold higher amounts of ovatoxin-a than palytoxin, and that toxin production and release in algal cultures depend on the growth phases of the culture (14).
- The isolation of a new palytoxin analogue (42-hydroxy-palytoxin) in extracts from *Palythoa* spp. collected along Hawaian coasts (15).

- The characterization of the changes induced in the proteome of human cells by palytoxin, okadaic acid and gambierol, and the demonstration that the cytotoxic responses induced by palytoxin and okadaic acid involve post-translational modifications of cell stress proteins (16,17).
- The study of the toxic effects of palytoxin after acute oral administration in mice, with the determination of its LD50 (767 µg/kg) and NOEL (300 µh/kg) (18).

Furthermore, information on other toxic algae (*Alexandrium* spp., *Protoceratium* spp, *Gonyaulax* spp,) and marine biotoxins (spirolides, yessotoxins) in Italian coastal waters have been also obtained in the course of this project (19-24).

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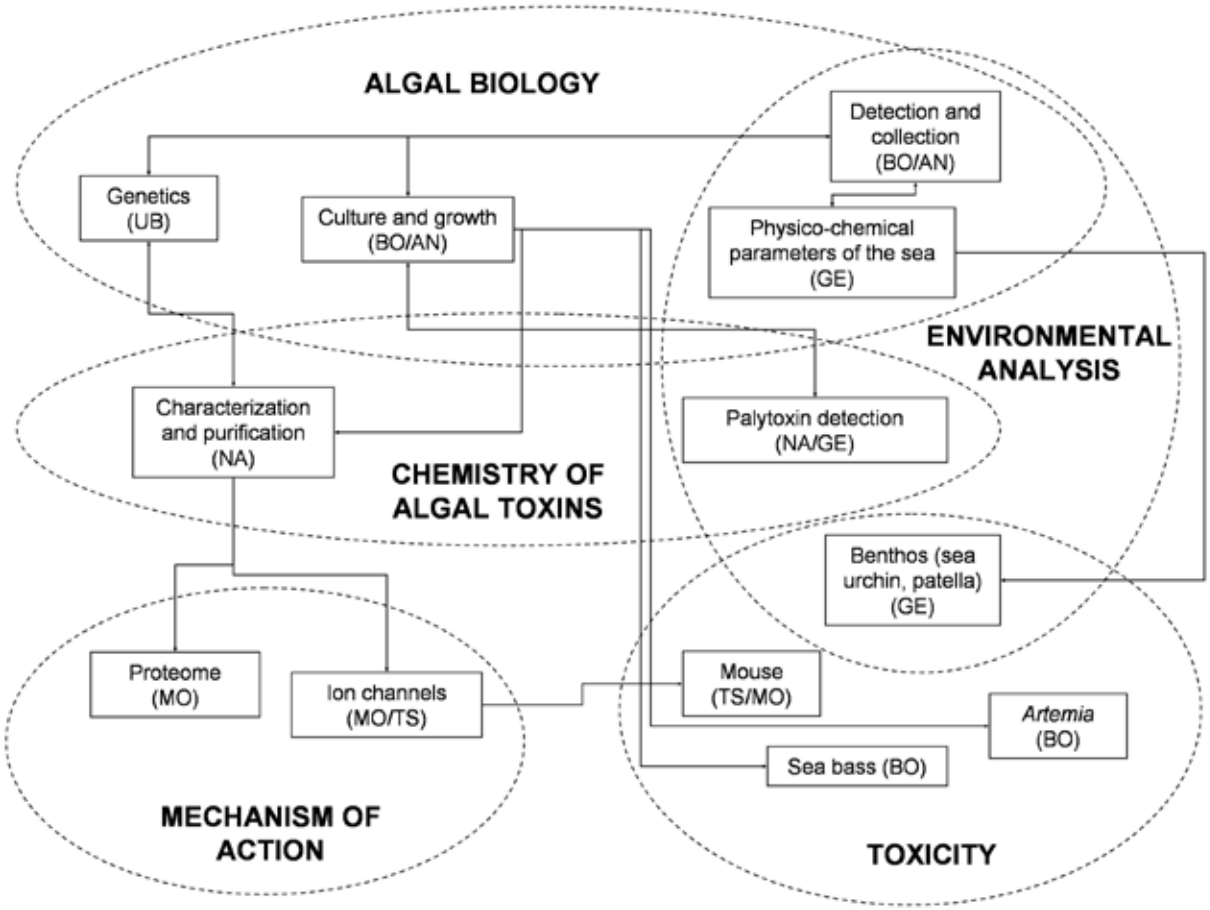

Fig. 1. Organization of research activities on *Ostreopsis* algae and the toxins they produce in the project "Marine biotoxins in Italian coastal waters: characteristics, origin, actions " supported by the Italian MIUR (grant 2007FXSCL2). Teams involved in the development of individual tasks are indicated by a two-letter code, as follows: MO, Università di Modena e Reggio Emilia; AN, Università Politecnica delle Marche; GE, Università di Genova; NA, Università di Napoli "Federico II"; TS, Università di Trieste; BO, Università di Bologna; UB, Università di Urbino "Carlo BO".

IST – TheFuture of venom research

Prof. John Perez

The future of venom research lies within the continuing training and mentoring of successive generations of researchers. Students working closely with established men and women in the venom research community have the advantage of learning current methods, while being trained to add to and improve upon these practices in years to come. Learning state-of-the-art techniques, now, will enable them to match the pace of technological advances. Mentoring programs in the laboratory environment are one of the best ways to teach future researchers, where students will have hands-on opportunities to learn. Having an experienced scientist work closely with individual or small groups of students can be more beneficial than several lectures in just the classroom setting. In order to promote the continuation and advancement of venom research, consistent effort is needed to encourage new researchers to join the ranks of biologists, chemists and other specialists in this field.

As part of its mission statement, the Natural Toxins Research Center (NTRC) at Texas A&M University – Kingsville, in the United States, has an obligation to provide training that will lead to the discovery of medically important toxins found in venoms. Students from the U.S. and other locations around the globe have come to the NTRC to study its methods of venom characterization, the isolation of proteins and other molecules, and recently, to learn methods of creating cDNA libraries to increase the volumes of molecules of interest. The NTRC's training resources have attracted the notice of student researchers from Thailand, India, China, and other countries, as well as from around the U.S.

Under the American Recovery and Reinvestment Act of 2009 passed by the United States Congress, the NTRC was able to expand its training endeavors to include a special, three-month summer program for three high school students and five college students, and also allowed for the addition of a guest professor. This summer program was extremely successful. Dr. John C. Perez, the Director of the NTRC, lectured to the students each morning and the students were divided into groups to conduct research with mentors at the NTRC. There were four groups, and each group was given a different research assignment, such as instrumentation separation science for venoms, tissue culture assays for testing the effects of toxins, activity assays for screening useful molecules that have important biomedical applications, and cloning of medically important toxins. The NTRC mentors were essential for the success of the program.

"The students conducted research for three months, which contributed to the NTRC mission. The summer program was more than just a training program for high school and college students; some of the research they conducted will result in publications along with faculty and staff. All of the students were bright and motivated. It was my pleasure to work with all students," says Dr. John C. Perez.

In addition to the NTRC mentors for the students, Dr. Perez, Dr. Elda Sanchez, Dr. Ying Jia, Montamas Suntravat, and Esteban Cantu. The guest professor, Dr. Angela Peterson-Ford who is an instructor of Pharmaceutical Sciences, joined the mentoring program via stimulus funding.
"My initial goal was to teach the fundamental techniques in research as it relates to understanding of how venom proteins can serve as a pivotal therapeutic tool in reversing such diseases such as stroke, preventing cardiovascular diseases, and retarding the metastizing of cancers," said Dr. Ford.

She also stated, "I want my students to become independent investigators of biomedical science...I truly enjoy teaching students and appreciate the opportunity to make a difference in our society and science. The ultimate assessment of my students will be seeing them obtain professorships at uni-

versities and becoming leaders and mentors in biomedical science."

As part of the program, the students were asked to submit statements about their experience learning and working under the researchers at the NTRC. Here are some of their statements about their experiences this summer:

Jennifer Allen:
"Working at the NTRC has allowed me the opportunity to learn lab techniques alongside several accomplished researchers and professors. The knowledge that I have gained this summer will benefit me greatly once I graduate and begin work in the field of biomedical science.

"Prior to joining the NTRC, I did not have any research experience. Even though my course load included several biology labs and chemistry labs, they did not offer the same challenging experience that the NTRC has given me. In those labs, the main goal was just to follow a procedure in which the results had already been well established. The NTRC leaves room for experimental improvement and the possibility that a procedure may lead to a novel discovery.

"Furthermore, the assays and tests that I have learned all have important real-life applications. I am now more aware of the mechanisms by which many diseases, such as cancer or Alzheimer's, act within the body and how the proteins we work with may be able to cure or prevent these illnesses from occurring. The possibility of making a difference is a huge motivation to succeed in my chosen profession."

Tracey Alvarado:
"I had a wonderful research experience here at the Natural Toxins Research Center and was grateful to be given this opportunity. My goal was to learn and understand the different principals of several different instruments, further my knowledge, and become a better researcher.

"During the summer program, I was able to learn about the different instruments used and how to apply these techniques to important biochemical research.

"My mentor, [Montamas Suntravat], was very helpful in training me to become a better researcher. When given the opportunity to present my research at seminars, I received excellent feedback and suggestions. These seminars also helped me understand other researchers' experiments and become familiar with other techniques.

My research of pro-coagulant inhibitors may be important in medical applications, which can be used as a model for drugs discovery in stroke patients or patients with thrombotic disorders.

"Dr. John C. Perez and Dr. Elda E. Sanchez were very helpful in supporting me with my educational and career goals. This opportunity has opened my eyes to the career of doing biomedical research and if given the opportunity to be in the summer research program again, I would not pass that chance."

Cody Bigelow:
"I'm a sophomore in high school. Before attending this research program, I had no background in a research lab or working with chemicals. Therefore, I had no idea what to expect. As for my professional goal, I planned on becoming a professor in chemistry.

"Thanks to this program, I have learned about the different types of instruments that are used in the lab and how to use and apply them in different assays. It also gave me knowledge on how these assays can be used to show how echistatin can prevent cancer cells from metastasizing to tissue.

"Thanks to this summer research program, my goals have not changed. I still plan on attending college. My professional goals have changed, a little. I still plan on becoming a professor in chemistry, but now I'm thinking about continuing my work at the NTRC."

Kelsi Gulick:
"Before working at the Natural Toxins Research Center here at Texas A&M University - Kingsville, my goals were to pursue a career in Pharmacy. Acquiring skills and experience to help me be admitted into pharmacy school were the main two reasons for my interest in the NTRC.

"I have acquired so many skills and many new concepts that will help me in my college career. I have learned many concepts in the field of Molecular Biology that correlates with medical research. Preparing presentations, designing well-rounded experiments, and preparing research reports are some of the things that this summer program has helped me master and will definitely place me a step ahead of other students.

"Working here at the NTRC has opened my eyes to a new career possibility in the field of pharmaceutical research. After being so directly involved in medical research I have now gained a new respect for people who work so diligently to develop a new drug."

The students seemed to enjoy working in a lab environment, and learning about the mission and procedures of the NTRC not only though lectures, but through performing actual research. They were given opportunities to give weekly seminar updates on their work, where the other students and NTRC staff were able to encourage and guide them as scientific peers and mentors.

Two of the summer student researchers, Tracey Alvarado and Danielle Calhoun, were able to adjust their class schedules to stay with the NTRC during the Fall 2009 college semester. Others who were not able to stay during the school year have expressed hopes of returning next summer and gaining even more biomedical research experience while helping further the NTRC mission of providing training while conducting research.

Programs of this nature are necessary to encourage students to pursue education and career goals in the venom research and biomedical communities. Mentoring is one of the best ways to pass on the knowledge, skills and enthusiasm needed to advance venom research.

Dr. Angela Ford, Jennifer Allen, Tracey Alvarado, Cody Bigelow, Ryan Bueno, Danielle Calhoun, Steel Gonzales, Kelsi Gulick, and Andriah Scott

1961 West Brichta Dr.
Tucson, AZ 85745, USA
Tel: 1 520 884-9345
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ponerine@dakotacom.net

Southwest Venoms

CATALOGUE OF INSECT VENOMS (2009-2010)

Prices in U.S. dollars. All venoms are pure venoms (not venom sac or apparatus homogenates) collected according to the methods of Schmidt (1986. *In:* Venoms of the Hymenoptera [T. Piek, ed.], pp. 425-508. Academic Press: London.).

Prod. No.	VENOM	(LD_{50} mg/kg, mice)	VENOM PRICE 1 mg	5 mg	25 mg	100 mg
	SOCIAL WASPS	(LD_{50})				
	Yellowjackets -- *Vespula*					
W-10	*V. pensylvanica*	(6.4)	50	225	1000	*
W-19	other species**		*			
	Hornets -- *Vespa*					
W-20	*V. mandarinia*	(4.1)	50	225	1000	*
W-21	*V. tropica*	(2.8)	50	225	1000	*
W-29	others **		*			
	Paper wasps -- *Polistes*					
W-30	*P. comanchus navajoe*	(5)	40	180	800	*
W-31	*P. flavus*	(3.8)	40	180	800	*
W-32	*P. canadensis*	(2.5)	50	225	*	
W-33	*P. erythrocephalis*	(1.5)	50	225	*	
W-39	*Polistes* sp. as available**		30	135	600	2100
	New World Polybiine wasps					
W-40	*Brachygastra mellifica*	(1.5)	60	270	1200	*
W-50	*Synoeca septentrionalis*	(2.7)	60	270	1200	*
W-60	*Parachartergus fraternus*	(5)	70	300	1400	*
W-70	*Polybia sericea*	(6)	80	350	*	
W-71	*P. simillima*	(4.1)	80	350	*	
W-72	*P. occidentalis*	(5)	100	*		
W-80	*Agelaia myrmecophila*	(5.6)	140	*		
	Old World Polybiine wasps					
W-90	*Belonogaster juncea colonialis*	(3)	80	350	*	
	SOCIAL BEES					
	Honey bees -- *Apis*					
B-10	*A. mellifera*	(2.8)	20	90	400	1400
B-11	*A. mellifera* Africanized bees	(2.8)	20	90	400	1400
B-12	*A. mellifera* queens		40	180	800	2800
B-13	*A. dorsata*	(2.8)	50	225	1000	3500
B-14	*A. cerana*	(3.1)	55	245	*	
B-19	others (*A. flo*rea, etc.)**		*			
	Bumble bees -- *Bombus*					
B-20	*B. sonorus*	(12)	50	225	1000	*
B-21	*B. impatiens*	(12)	50	225	*	
B-29	other species**		30	*		

Prod. No.	VENOM	(LD_{50} mg/kg, mice)	VENOM PRICE 1 mg	5 mg	25 mg	100 mg
	ANTS -- FORMICIDAE	(LD_{50})				
	Pogonomyrmex -- harvester ants					
A-10	*P. barbatus*	(0.6)	50	225	1000	3500
A-11	*P. maricopa*	(0.12)	60	270	1200	4200
A-12	*P. occidentalis*	(0.5)	70	315	1400	*
A-13	*P. rugosus*	(0.7)	50	225	1000	3500
A-15	*P. desertorum*	(0.7)	160	*		
A-19	*Pogonomyrmex* sp. as available		45	200	900	3200
	Myrmecia -- bull ants					
A-20	*M. gulosa*	(0.18)	60	270	1200	4200
A-21	*M. tarsata*	(0.18)	60	270	1200	*
A-22	*M. browningi*	(0.18)	70	315	*	
A-23	*M. rufinodis*	(0.35)	70	315	*	
A-24	*M. simillima*	(0.21)	70	315	*	
A-25	*M. pilosula*	(5.7)	100	*		
A-30	*Pachycondyla (Neoponera) villosa*	(7.5)	60	270	*	
A-31	*P. (Neoponera.) apicalis*	(>16)	70	*		
A-32	P. *crassinoda*	(2.8)	80	*		
A-33	*P. (Megaponera) foetens* (Metabele ant)	(130)	70	315	*	
A-34	*P. (Paltothyreus) tarsatus* (stink ant)	(64)	50	225	1000	3500
A-35	*P. (Bothroponera) strigulosa*	(9)	70	*		
A-36	*Termitopone commutata*	(10)	70	315	1400	*
A-40	*Platythyrea lamellosa*	(11)	70	315	*	
A-50	*Diacamma* sp.**	(35)	100	450	*	
A-60	*Dinoponera gigantea*	(11)	60	270	1200	4200
A-70	*Paraponera clavata* (bullet ant)	(6.0)	60	270	1200	4200
A-80	*Ectatomma tuberculatum*	(1)	60	270	*	
A-81	*E. quadridens*	(17)	60	270	*	
A-90	*Odontomachus* sp.**	(33)	60	275	*	
A-110	*Tetraponera* sp**	(.35)	140	600	*	
A-120	*Streblognathus aethiopicus*	(8.0)	80	360	*	
	SOLITARY WASPS AND BEES					
	Spider wasps -- Pompilidae					
SW-10	*Pepsis* sp.**	(65)	60	270	1200	4200
	Mutillid wasps -- Mutillidae					
SW-20	*Dasymutilla* sp.**	(71)	70	315	1400	*
SW-39	Other wasps (Scoliidae, Tiphiidae, Sphecidae, Eumenidae, etc.)**		*			
	Carpenter bees -- *Xylocopa*					
SB-10	*X. californica*	(21)	50	225	1000	*
SB-11	*X. veripuncta*	(33)	55	245	*	
SB-20	*Proxylocopa rufa*	(11)	100	450	*	
SB-39	Other bees**		*			

*Inquire for prices and availability.
**Available species provided; exact determinations usually included.

Natural Toxins Research Center (NTRC)

Texas A&M University Kingsville

Venom Quality Guarantee

Authenticity of Species • Purity of Venom
Maximum Biological Activity • Our Venom is Never Pooled

Snake venoms contain important molecules which are valuable for researching the treatments of strokes, heart attacks, and cancer.

The Natural Toxins Research Center (NTRC) at Texas A&M University-Kingsville is dedicated to providing high quality snake products for biomedical research. We are committed to the procurement and distribution of venoms, venom fractions and tissue for biomedical research. Venoms from the same species can be different, and therefore extracted venoms are never pooled. Each vial contains venom from a single snake, and venoms of the same species are never mixed. The vials are labeled with the snakes' scientific and common names, ID tag number and sex. The ID tag number can be traced back to the NTRC Internet Database (ntrc.tamuk.edu/cgi-bin/serpentarium/snake.query) for additional information about each snake.

(A) - neurotoxic venom
(B) - non-neurotoxic venom
****Subject to availability***

Southern Copperhead - *Agkistrodon contortrix contortrix*	$75.00/1g	$50.63/500mg			
Broad-Banded Copperhead - *Agkistrodon contortrix laticinctus*	$100.00/1g	$67.50/500mg			
Northern Copperhead - *Agkistrodon contortrix mokasen*	$50.00/1g	$33.75/500mg			
Trans-Pecos Copperhead - *Agkistrodon contortrix pictigaster*	$75.00/1g	$50.63/500mg			
Florida Cottonmouth - *Agkistrodon piscivorus conanti*	$60.00/1g	$40.50/500mg			
Western Cottonmouth - *Agkistrodon piscivorus leucostoma*	$56.00/1g	$37.80/500mg			
Eastern Diamondback Rattlesnake - *Crotalus adamanteus*	$50.00/1g	$33.75/500mg			
Western Diamondback Rattlesnake - *Crotalus atrox*	$45.00/1g	$30.38/500mg			
Sonoran Sidewinder - *Crotalus cerastes cercobombus*	$125.00/1g	$84.38/500mg			
Timber Rattlesnake - *Crotalus horridus*	$70.00/1g	$47.25/500mg			
Mottled Rock Rattlesnake - *Crotalus lepidus lepidus*	$125.00/1g	$84.38/500mg			
Blacktail Rattlesnake - *Crotalus molossus molossus*	$400.00/1g	$270.00/500mg	$72.90/100mg	$49.21/50mg	
Great Basin Rattlesnake - *Crotalus oreganus lutosus*	$125.00/1g	$84.38/500mg			
Grand Canyon Rattlesnake - *Crotalus oreganus abyssus*	$250.00/1g	$168.75/500mg	$45.56/100mg	$30.75/50mg	
Texas Coral Snake - *Mircrurus tener tener*	$2000.00/1g				
Florida Coral Snake - *Mircrurus fulvius*	$1800.00/1g				
Southern Pacific Rattlesnake - *Crotalus oreganus helleri*	$400.00/1g	$270.00/500mg	$72.90/100mg	$49.21/50mg	
Northern Pacific Rattlesnake - *Crotalus oreganus oreganus*	$400.00/1g	$270.00/500mg	$72.90/100mg	$49.21/50mg	
Mohave Rattlesnake - *Crotalus scutulatus scutulatus (A)*	$250.00/1g	$168.75/500mg	$45.56/100mg	$30.75/50mg	
Mohave Rattlesnake - *Crotalus scutulatus scutulatus (B)*	$1000.00/1g	$675.00/500mg	$182.25/100mg	$123.02/50mg	$33.22/10mg
Prairie Rattlesnake - *Crotalus viridis viridis*	$70.00/1g	$47.25/500mg			
Red Spitting Cobra - *Naja pallida*	$100.00/1g	$67.50/500mg			
Desert Massasauga - *Sistrurus catenatus edwardsii*	$1000.00/1g	$675.00/500mg	$182.25/100mg	$123.02/50m	$33.22/10mg
Western Massasauga - *Sistrurus catenatus tergeminus*	$1000.00/1g	$675.00/500mg	$182.25/100mg	$123.02/50mg	$33.22/10mg
Bushmaster - *Lachesis muta muta*	$2000.00/1g	$1350.00/500mg	$364.50/100mg	$246.04/50mg	$66.43/10mg

Venom is collected under stringent laboratory conditions using disposable labwear for each extraction. Venom is collected in new, non-reusable plastic cups with parafilm coverings. Snakes are allowed to bite into the parafilm diaphragm and the venom glands are not massaged. Immediately following collection, each venom sample is clarified by centrifugation at 500 x g for 5 minutes to remove cellular debris and frozen at -90º C until lyophilized.

Foreign Investigators: Please note that your order may be subject to import duties, taxes, tariffs, customs charges, DDP, VAT, and the like, once your package reaches your country. It is your responsibility to pay for these charges. The Natural Toxins Research Center will not be responsible for paying these charges, and we will not bill you for such charges when you place your order.

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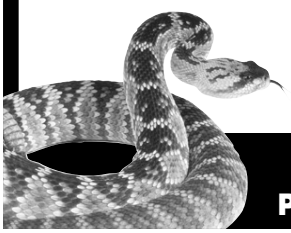

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Austrelaps superbus	$400	$1,600
Austrelaps labialis	$700	$3,000
Bitis arietans	$70	$300
Bitis rhinoceros	$75	$340
Bitis nasicornis	$75	$340
Bothriechis schlegelii	$200	$850
Crotalus adamanteus	$100	$450
Crotalus unicolor	$200	$900
Crotalus vegrandis	$160	$700
Hoplocephalus stephensii	$220	$900
Hoplocephalus bitorquatus	$220	$900
Naja kaouthia	$60	$250
Naja melanoleuca	$50	$200
Naja mossambica	$60	$250
Naja siamensis	$60	$250
Notechis ater humphreysi	$350	$1,600
Notechis ater niger	$350	$1,600
Notechis ater serventyi	$350	$1,600
Notechis scutatus	$300	$1,445
Ophiophagus hannah	$200	$850
Oxyuranus microlepidotus	$300	$1,300
Oxyuranus scutellatus	$260	$1,250
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Pseudechis colletti	$110	$500
Pseudechis guttatus	$110	$500
Pseudechis porphyriacus	$140	$650
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Venom Price List 2009-2010
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Crotalidae

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Agkistrodon contortrix phaeogaster	$70.00
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Agkistrodon piscivorus piscivorus	$45.00
Bothrops asper	$100.00
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Bothrops moojeni	$100.00
Crotalus adamanteus	$60.00
Crotalus atrox	$70.00
Crotalus basiliscus basiliscus	$200.00
Crotalus cerastes	$100.00
Crotalus durissus cumanensis	$300.00
Crotalus durissus durissus (fmr. *C. d. dryinas*)	$200.00
Crotalus durissus terrificus	$175.00
Crotalus horridus	$100.00
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Crotalus molossus (Texas origin)	$70.00
Crotalus scutulatus scutulatus	$250.00
Crotalus viridis viridis	$70.00
Protobothrops flavoviridis	$200.00
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Naja nigricollis nigricollis	$80.00

Naja nivea	$100.00
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- Other venoms are available upon request in small quantities; please contact us for more information on other venoms
- CITES papers available on all CITES listed species. Extra costs apply for permits and inspection fees.
- Locale information available for most species.
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