

STRI newsletter

October 4, 1991

SMITHSONIAN TROPICAL RESEARCH INSTITUTE - Apartado 2072, Balboa, Panama

No. 40

TUPPER CENTER SEMINARS

Tuesday, October 8, noon seminar speaker will be David Zeh, STRI 3-year post-doctoral fellow.

Sexual Selection in a Beetle-riding Pseudoscorpion: The Ecological Theater As the Key to Understanding the Evolutionary Play

Abstract

Sexual selection is increasingly recognized as a pervasive evolutionary force. But despite recent advances in the study of sexual selection, the maintenance of variation in sexually-selected traits remains a poorly understood and highly controversial topic. Although models have shown temporal and spatial environmental variation to be mechanisms which can maintain genetic variability, few investigations have quantified the impact of these factors on the operation of sexual selection in nature. This study was carried out on a pseudoscorpion (Arachnida) which inhabits decaying trees for several generations before dispersing to new habitats under the wings of the harlequin beetle. Male pseudoscorpions exploit beetles' abdomens as mobile mating territories on which they intercept and inseminate dispersing females. Evidence from behavioral, quantitative genetic and DNA fingerprinting studies suggest that the extreme variability among males of this pseudoscorpions is maintained through regular oscillations between selection for small size/mate-searching ability within trees and sexual selection for large size/fighting ability on beetles.

Next Week

Tuesday, October 15, noon seminar speaker will be Harvey Pough, Cornell University.

Mimicry of Vertebrates: Are the Rules Different?



On Thursday, September 26, Vielka Chang-Yau briefed members of the diplomatic corps and Panamanian legislators about the STRI library, as part of a special outreach program to acquaint members of the community about STRI activities ••• El jueves 26 de septiembre Vielka Chang-Yau presentó la biblioteca a miembros del cuerpo diplomático y a legisladores panameños que la visitaron, como parte de un programa para dar a conocer las actividades del STRI a miembros de la comunidad.

(Foto: M.A. Guerra)

PEOPLE

Arrivals

- Kenneth Clifton, STRI postdoctoral fellow, Oct 6, 1991-Apr 30, 1992, to work on current group size models using the Caribbean striped parrotfish *Scarus iserti* at San Blas.

Departures

- Alejandro Arze, Oct 4-28, STRI security officer, to Vienna, Austria, to attend the meetings of the International Conference of Museum Security. After the conference he will take a short vacation.
- Monica Alvarado, Oct 5-11, STRI protocol officer, to San Jose, Costa Rica, at the invitation of CATIE, to attend the workshop/symposium on *Strategies for sustaining natural resources in Central America*.

On Leave

- Leonor Motta, Oct 1-18.

UPCOMING EVENTS

Monday, Oct 7

- Academic Board Meeting, Tupper Meeting Room, 1:30 pm.

Tuesday, Oct 8

- Scientific Staff Meeting will be held at the Tupper Meeting Room at 9:30 am.

THINGS YOU SHOULD KNOW

Transportation to BCI ••• *Transporte a BCI*

Until further notice the Las Cruces will be used to transport people to BCI, due to unexpected repairs on the Jacana. The morning schedule remains unchanged but in the afternoon the launch will leave BCI at 3:20 pm ••• *Hasta nuevo aviso se usará la lancha Las Cruces para el transporte a Barro Colorado, por un daño en la Jacana. El horario de la mañana seguirá igual, pero en la tarde la lancha saldrá de la isla a las 3:20 pm.*

Research Funding Received

- Ross Robertson, STRI marine scientist, received a grant from the National Geographic Society to conduct research at Las Perlas and San Blas on the larval biology of neotropical reef fish.
- William Eberhard, STRI scientist, received a grant from the Scholarly Studies Fund to develop the research proposal on *How sexual selection works in nature: new insights from DNA fingerprinting* for two years.
- Donald Windsor, STRI entomologist, received a grant from the Scholarly Studies Fund to do research on *Molecular phylogenies of figs, fig wasps and nematodes* for two years.

Change of Address

If you need to contact or mail correspondence to Allen Herre between Oct 12, 1991 and Apr 15, 1992 please address it to: Allen Herre, c/o Dr. Jackes Van Alphen, University of Leiden, Department of Biology, Kaiserstraat 63, P.O.B. 9516, 2300 RA Leiden, The Netherlands. Tel: 31-71-27-4992 or 27-4990. Fax: 31-71-27-4900.

ANNOUNCEMENTS

Temporary Position ••• *Posición Temporal*

The Smithsonian Tropical Research Institute is seeking a person to work on a 4-month temporary appointment beginning November 1, to develop a proposal for a public education exhibit featuring the marine environments and resources of Panama. The person should have a university degree in biology or a related field in the natural sciences, be fluent in written and spoken English, and possess some knowledge in the design and implementation of public education programs in a museum or visitor center setting. Please submit a curriculum vitae highlighting experience

in public education and a sample of writing ability to: STRI Office of Human Resources by October 15 ••• *STRI busca a persona para una posición temporal de 4 meses comenzando el 1ro de noviembre, para desarrollar una propuesta para una exhibición de educación pública sobre los ambientes marinos y sus recursos en Panamá. El/la solicitante deberá tener diploma universitario en biología o áreas afines en ciencias naturales, tener un manejo excelente del inglés hablado y escrito, y poseer conocimientos sobre el diseño y la implementación de programas de educación pública en museos o centros de visitantes. Favor entregar su hoja de vida resaltando su experiencia en educación pública y una muestra de su capacidad de redacción a la Oficina de Recursos Humanos de STRI antes del 15 de octubre.*

Join Us, Exercise and Have Fun! ••• *Acompáñanos, Entrénate y Diviértete!*

The next great sporting event at STRI will take place on Friday, November 22, at 4:30 p.m. at the Amador Causeway. The activities include a race, a 2.5 km walk and bicycling. Inscription is free. For more information, contact Leopoldo Leon at Tivoli/Tupper, Nelida Gomez on BCI, Argelis Guevara or Amalia Herrera at Naos, Carlos Guevara at Galeta, Reinaldo Tapia in San Blas, and Osmila Sanchez at the Oil Spill Project ••• *El próximo gran evento deportivo de STRI se llevará a cabo el viernes 22 de noviembre de 1991 a las 4:30 p.m. en la Calzada de Amador. Las actividades incluyen carrera, caminata de 2.5 km y ciclismo. La inscripción es gratuita. Para mayor información comuníquese con Leopoldo León, Tivoli/Tupper, Néilda Gómez en BCI, Argelis Guevara y Amalia Herrera en Naos, con Carlos Guevara en Galeta, Reinaldo Tapia en San Blas y Osmila Sánchez en el Proyecto de Derrame de Petróleo.*

Audubon Talk

Speaker: Neal Smith

Title: *The greatest annual natural history event in Panama*

Place: PCC Training Center in Balboa

Date: Thursday, Oct 10, 7:30 pm.

Study in the United States

Admissions officials from 20 colleges and universities will discuss opportunities for study in the United States at the Marriot Caesar Park Hotel, Grand Ballroom, Tuesday, October 8, from 5 to 8 pm. Following the presentation, you will be able to meet with the University representatives. Admission to this program is free and parents are encouraged to attend.

Carta Perdida

La Oficina de Visitantes recibió una carta cuyo remitente es Azon Mooldert, Lista de Correos, Guadalupe, Costa Rica. Si alguna persona reconoce al remitente, favor retirar esta correspondencia con Isis Ivancic.

RESEARCH UPDATE

Ladies and gentlemen, on this planet we are all guests of the green plants.

—opening words at a recent seminar by STRI scientist Klaus Winter

by Gretchen Sotomayor

Science has revealed much about photosynthesis, the process that plants use to provide us with oxygen to breathe and ozone-strengthening molecules to filter the sun's harmful ultraviolet rays. But, despite all that we know, there is much more to learn.

At STRI, what peaks the interest of plant physiologist Dr. Klaus Winter are those unique plants that can biochemically adjust to the stress of climatic changes without dying. Some plants are capable of switching the time of day that they incorporate atmospheric carbon dioxide (CO₂) for photosynthesis, for example from day to night. Often this change occurs in reaction to a severe change in water availability.

"Unlike humans or animals, plants cannot simply walk away when put under stress," Winter said.

Though most plants fix carbon dioxide during the day, using CO₂ and the sun's light energy to immediately synthesize carbohydrates, an estimated five to 10 percent of all higher plants fix CO₂ at night. Succulent plants, such as cacti and stonecrops, are examples.

Winter admits a fascination for plants that have the option of both day and night carbon gain, a unique survival mechanism found in only a small fraction of the plant world.

"Can the plant that can switch pathways to fix (carbon dioxide) be more successful than one that can't?" said Winter, repeating a fundamental question to his research.

Winter, who recently joined STRI's permanent scientific staff, has devoted much of his career to the study of Crassulacean Acid Metabolism (CAM), a nighttime mode of carbon fixation. One focus of his research at STRI is understanding how and why some tropical plants change from light to dark CO₂ fixation. At STRI, Winter is stud-



Klaus Winter

(Photo: C.C. Hansen)

ying; tropical plants such as *Clusia odorata*, bromeliads, the edible pineapple and seawater-loving mangroves.

Before coming to Panama five months ago from West Germany, Winter studied the CAM process for many years in a highly salt-tolerant annual, *Mesembryanthemum crystallinum*, native to Mediterranean climates. In the CAM process, chloroplast-containing cells "fix" carbon dioxide (CO₂) via the enzyme PEP carboxylase, at night. The incorporated carbon is stored in the form of malic acid and, during the subsequent day, is used in the light as an internal CO₂ source for conventional photosynthesis.

Mesembryanthemum is capable of switching from one photosynthetic mode, known as C₃ photosynthesis, to the CAM method when water is scarce. The change from C₃ to CAM involves the production of messenger RNA, which leads to the synthesis of enzymes like PEP carboxylase and thus, the beginnings of the CAM process. It is still not known what factor actually triggers the production of mRNA or, i.e., how the physical signal (leaf water deficit) is translated into the biochemical response, Winter said.

In his early studies of *Clusia odorata* on Barro Colorado Island, Winter and his collaborators, including German doctoral student Gerhard Zotz, have learned that the stimulating effect for switching photosynthesis pathways is different from *Mesembryanthemum*. The stimulating factor is indirect, unlike the direct effect of water deficit in *Mesembryanthemum*, Winter says. The indirect factor could be a lowered carbon gain during daytime photosynthesis. Exploring the underlying mechanisms to this is one of Winter's objectives in his coming years of research at STRI.

In addition to his research with *Clusia odorata*, Winter is also studying plants severely deprived of light or exposed to very high irradiance.

An example of such exposure might occur when a large tree in the forest falls, leaving a hole in the forest ceiling, or canopy. Tree seedlings accustomed to shade would be exposed to strong light, perhaps for the first time. Winter is collecting data from both natural and artificial living conditions, and will try to determine the extent to which survival and photosynthetic performance is controlled by environmental, developmental and genetic factors.

In his research at the Tupper Center and on Barro Colorado Island, Winter uses a large variety of sophisticated equipment. Winter is using some equipment new to STRI but familiar to the scientist from past years of research. At the Tupper Center, labs and greenhouses for Winter's research are found on three different floors.

In the greenhouses, some plants bake in direct sunlight while others hide in the shade under a protective blanket. On the roof of Tupper Center, large, clear cylindrical barrels await a role in an experiment where plants will grow under intense light and machine-fed carbon dioxide.

Once the labs are assembled, the possibilities for studying various aspects of photosynthesis are numerous. For example, one important lab houses enclosed glass chambers and boxy monitors linked with tubes and pipe. This equipment precisely measures and controls gas exchange levels of a plant, such as carbon dioxide input or the rate of transpiration.

Another method, fluorescence, uses fiber optics to measure photosynthetic activity at the chloroplast level without having to destroy the leaf. The spectrophotometer, another option for gathering data, measures the amount of chlorophyll and other pigments and charts the activity levels of enzymes extracted from the leaves.

Winter and his colleagues are using many different methods for collecting data because all of the information gathered is necessary to understand such complex plant processes and arrive at final conclusions.



Elizabeth Brennan from the SI Office of Human Resources gave a week-long series of lively training seminars at the STRI Tupper Center organized by the STRI Personnel Office and attended by personnel from all facilities, from September 23-27 ••• Elizabeth Brennan de la Oficina de Recursos Humanos del SI, dictó una serie de seminarios de entrenamiento muy amenos en el Centro Tupper organizados por la Oficina de Personal del STRI, del 23-27 de septiembre, en donde participó personal de todas las instalaciones.

(Foto: M.A. Guerra)

STRI NEW PUBLICATIONS

- Anderson, Alun. 1991. "The Smithsonian's Tropical Niche." *Nature* 349(6311): 647-648.
- Joyce, Christopher. 1991. "A Crane's Eye View of Tropical Forests." *New Scientist* 21 September 1991: 40-42.
- Königer, Martina and Winter, Klaus. 1991. "Carotenid Composition and Photon-Use Efficiency of Photosynthesis in *Gossypium hirsutum* L. Grown Under Conditions of Slightly Suboptimum Leaf Temperatures and High Levels of Irradiance." *Oecologia* 87: 349-356.
- Salazar Allen, Noris. 1991. "Editorial." *Briolatina* 24: 1-2.
- Spörle, Jörg, Becker, Hans, Salazar Allen, Noris and Gupta, Mahabir P. 1991. "Occurrence of (-)-Geosmin and Other Terpenoids in an Axenic Culture of the Liverwort *Symphyogyna brongniartii*." *Zeitschrift für Naturforschung* 46: 183-188.

From: 365 Ways to Save our Planet

• Page-a-Day Calendar •

A better mouse-trap • Mechanical traps for rats and mice are generally preferable to poisons. Judiciously placed, they're less of a threat to pets, children and wildlife, and they don't leave behind dangerous chemical residues.

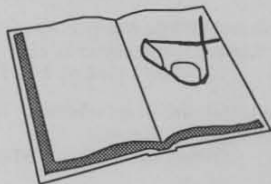
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STRI LIBRARY NEW BOOKS



A Device for maintaining constant concentration of dissolved oxygen and temperature in a closed aquarium system/by C.J. de B. Beyers and C.G. Wilke.
SH153.B57 1990 STRI.

Alternatives to deforestation: steps toward sustainable use of the Amazon rain forest/Anthony B. Anderson, editor.
SD418.3.A53A526 1990X STRI.

Applied myrmecology: a world perspective/edited by Robert K. Vander Meer, Klaus Jaffe, and Aragua Cedeño.
QL568.F7A58 1990X STRI.

Atlas of sponge morphology = Atlas de morphologie des eponges/by Louis De Vos ... [et al.]
QL374.A87 1991X STRI.

Atlas of the world with geophysical boundaries: showing oceans, continents and tectonic plates in their entirety/Athelstan Spilhaus.
Ref G1021.S85 1991 STRI.

Biogeography/James H. Brown, Arthur C. Gibson.
QH84.B76 1983X STRI.

Biology of the vespine wasps/M. Matsuura, S. Yamane.
QL568.V5M3813 1990X STRI.

Birds of relict forests in the High Andes of Peru and Bolivia: technical report from the polylepsis forest expedition of the Zoological Museum, 1987/Jon Fjeldsa.
QL689.P5F56 1987 STRI.

Brainstem mechanisms of behavior/edited by W.R. Klenn, Robert P. Vertes.
QP376.8.B725 1990X STRI.

Causes of evolution: a paleontological perspective/edited by Robert M. Ross and Warren D. Allmon ; with a foreword by Stephen Jay Gould. QH366.2.C39 1990X STRI.

Cladistic biogeography/Christopher J. Humphries and Lynne R. Parenti.
QH83.H86 1987Y STTI.

Comarca de la biosfera de Kuna Yala: plan general de manejo y desarrollo: resumen ejecutivo.
S934.P6C72 1990 STRI.

Community food webs: data and entry/Joel E. Cohen et al.
QH541.15.M3C63 1990X STRI.

Conditions not of their choosing: the Guaymi Indians and mining multinationals in Panama/Chris N. Gjording.
F1565.G8G65 1991X STRI.

CRC handbook of techniques for aquatic sediments sampling/editors, Alena Mudroch, Scott D. MacKnight.
GC380.2.S28H36 1991X STRI.

Development of sensory systems in mammals/edited by James R. Coleman.
QP431.D38 1990X STRI.

Ecological responses to environmental stresses/edited by J. Rozema & J.A.C. Verkleij. QK754.E36 1991X STRI.

Ecology and land management in Amazonia/Michael J. Eden.
HD466.E34 1990X STRI.

Economics of protected areas: a new look at benefits and costs/John A. Dixon, Paul B. Sherman.
QH77.D44D59 1990X STRI.

Efectos directos de nemátodos en avispas polinizadoras de *Ficus citrifolia* y efectos indirectos en sus frutos/por Adalberto Gómez Zúñiga. QL568.V5G63 1991a STRI.

Estudios sobre el lobo marino en el noroeste de México.
QL737.P63E82 1990 STRI.

Evolution of environments and hominidae in the African Western Rift Valley/edited by Noel T. Boaz.
GN282.5.E88 1990X STRI.

Excavations at Seibal, Department of Peten, Guatemala: peripheral survey and excavation, settlement and community patterns/Gair Tourtellot.
F1435.1.S44T73 1988 STRI.

Expected effects of climatic change on marine coastal ecosystems/edited by J J. Beukema et al.
QH541.5.S3E97 1990X STRI.

Flavonoid metabolism/Helen A. Stafford.
QK898.F5S73 1990X STRI.

Frontiers in crustacean neurobiology/edited by K. Wiese ... [et al.]
QL435.F76 1990X STRI.

Genetics of perception and communications/edited by Charles J. Wysocki, Morley R. Kare.
QP455.G46 1991X STRI.

- Gibberellins/Nobuta Takahashi, Bernard O. Phinney, Jake MacMillan, editors. QK898.G45G49 1991X STRI.
- Historical review [of] the Darien Gap Project/Síntesis histórica del proyecto Tapón del Darién. HE359.P33I4713X STRI.
- Human paleobiology: current syntheses and future options/edited by Donal J. Ortner & Arthur C. Aufderheide. R134.8.H86 1991X STRI.
- Insect-plant interactions/editor, Elizabeth A. Bernays. QL496.I388 1989X v.2 STRI.
- Marine gastropods from Curacao, Aruba, and Bonaire/by K.M. de Jong and H.E. Coomans. QL430.4.J59 1988X STRI.
- Methods for fish biology/edited by Carl B. Schreck & Peter B. Moyle. QL618.5.M592 1990 STRI.
- Microbial mediation of plant-herbivore interactions/edited by Pedro Barbosa et al. QH548.3.M53 1991X STRI.
- Microtubules/Pierre Dustin. QH603.M44D87X STRI.
- Minding the carbon store: weighing U.S. forestry strategies to slow global warming/Mark C. Trexler. QC981.8.G56T817 1991 STRI.
- Mola art from the San Blas Islands/ Kit S. Kapp. TT840.K17 STRI.
- Nature reserves: island theory and conservation practice/Craig L. Shafer. QH75.S474 1990X STRI.
- Observed and modelled growth of red drum in aquacultural ponds in the Republic of Panama/by Humberto Arturo Gárces Botacio. QL638.S34G215 1991a STRI.
- Patterns in the structure of mammalian communities/edited by Douglas W. Morris ... [et al.] QL703.P35 1989X STRI.
- Plant growth substances 1988/Richard P. Pharis, Stewart B. Rood, eds. QK745.P58 1988X STRI.
- Preserving the global environment: the challenge of shared leadership/Jessica Tuchman Mathews, editor. HC110.E5P68 1991X STRI.
- Signal perception and transduction in higher plants/edited by Raoul Ranjeva, Alain M. Boudet. QK725.N374 1991X STRI.
- Social insects and the environment: proceedings of the 11th International Congress of IUSSI, 1990 (International Union for the Study of Social Insects)/editors, G.K. Veeresh, B. Mallik, C.A. Viraktamath. QL496.I43 1990n STRI.
- The Biology of scorpions/edited by Gary A. Polis. QL458.7.B86 1990X STRI.
- The Causes of evolution/J.B.S. Haldane ; with a new introduction and afterword by Egbert G. Leigh, Jr. QH366.H45 1990X STRI.
- The Evolution of parental care/T.H. Clutton-Brock ; with original drawings by Dafila Scott. QL762.C48 1991X STRI.
- The Fungal spore and disease initiation in plants and animals/edited by Garry T. Cole and Harvey C. Hoch. QR245.F854 1991X STRI.
- The Known birds of North and Middle America: distributions and variation, migrations, changes, hybrids, etc. QL681.K73 1986 pt. 2 STRI.
- The Natural environment and the biogeochemical cycles/with contributions by P. Craig ... [et al.]. QH344.N28 1990 pt.E STRI.
- The Plant plasma membrane: structure, function, and molecular biology/C. Larsson, I.M. Moller (eds.). QK725.P573 1990X STRI.
- The Politics of culture/Brett Williams, editor. GN492.P66 1991X STRI.
- The Sacred mushroom seeker: essays for R. Gordon Wasson/edited by Thomas J. Riedlinger. GN21.W38S23 1990X STRI.
- The "African" honey bee/edited by Maria Spivak ... [et al.]. QL568.A6A35 1991X STRI.
- Toribanecho zoku (Ornithoptera): kaisetsu to mokuroku/S-umiyoshi Kaoru. QL561.P2S95 1989 STRI.
- Tropical forests: some African and Asian case studies of composition and structure/Ján Borota. SD247.B67 1991X STRI.



Coral reef graffiti