

Ethnobotany/ethnopharmacology and mass bioprospecting: Issues on intellectual property and benefit-sharing

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Abstract: Ethnobotany/ethnopharmacology has contributed to the discovery of many important plant-derived drugs. Field explorations to seek and document indigenous/traditional medical knowledge (IMK/TMK), and/or the biodiversity with which the IMK/TMK is attached, and its conversion into a commercialized product is known as bioprospecting or biodiversity prospecting. When performed in a large-scale operation, the effort is referred to as mass bioprospecting. Experiences from the mass bioprospecting efforts undertaken by the United States National Cancer Institute, the National Cooperative Drug Discovery Groups (NCDDG) and the International Cooperative Biodiversity Groups (ICBG) programs demonstrate that mass bioprospecting is a complex process, involving expertise from diverse areas of human endeavors, but central to it is the Memorandum of Agreement (MOA) that recognizes issues on genetic access, prior informed consent, intellectual property and the sharing of benefits that may arise as a result of the effort. Future mass bioprospecting endeavors must take heed of the lessons learned from past and present experiences in the planning for a successful mass bioprospecting venture. © 2005 Elsevier Ireland Ltd. All rights reserved.

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References:

- Alexiades, M.N., (1996) Selected Guidelines for Ethnobotanical Research: A Field Manual, , New York Botanical Garden Bronx, NY
- Bien, L.K., Hiep, N.T., Loc, P.K., Cuong, N.M., Soejarto, D.D., The diversity of the flora of Vietnam 14. *Symphorema* Roxb. and *S. involucreatum* Roxb., a new genus and species occurrence for the flora of Vietnam (2003) *Genetics and Applications*, 3, pp. 34-38
- Bien, L.K., Hiep, N.T., Soejarto, D.D., Cuong, N.M., Loc, P.K., The diversity of the flora of Vietnam 16. Some more data on *Tubocapsicum* (Wettst.) Makino and *T. anomalum* (Franch. et Savat.) Makino (Solanaceae), little known genus and species of the flora (2004) *Genetics and Applications*, 2, pp. 28-32
- Chien, N.Q., Hung, N.V., Santarsiero, B.D., Mesecar, A.D., Cuong, N.M., Soejarto, D.D., Pezzuto, J.M., Tan, G.T., New 3-O-acyl betulinic acids from *Strychnos vanprukii* Craib (2004) *Journal of Natural Products*, 67, pp. 994-998
- Cragg, G.M., Paclitaxel (Taxol): A success story with valuable lessons for natural product drug discovery and development (1998) *Medical Research Review*, 18, pp. 315-331
- Cragg, G.M., Boyd, M., Drug discovery and development at the National Cancer Institute: The role of natural products of plant origin (1996) *Medicinal Plant Resources of the Tropical Forest*, pp. 101-136. , M.J. Balick E. Elisabetsky S.A. Laird Columbia University Press New York
- Cragg, G.M., Schepartz, S.A., Suffness, M., Grever, M.R., The taxol supply crisis. New NCI policies for handling the large-scale production of novel natural product anticancer and anti-HIV agents (1993) *Journal of Natural Products*, 56, pp. 1657-1668
- Cragg, G.M., Simon, J.E., Jato, J.G., Snader, K.M., Drug discovery and development at the National Cancer Institute: Potential for new pharmaceutical crops (1996) *Progress in New Crops*, pp. 554-560. , J. Janick ASHS Press Arlington, VA
- Dac, L.X., Hai, H.H., Ha, D.T.H., Danh, N.T., Xuan, L.T., Hai, N.V., Binh, L.T., Micropropagation and biodiversity conservation of *Litsea verticillata* collected from Cuc Phuong National Park by using plant tissue culture technique (2004) *Journal of Biotechnology*, 2, pp. 479-486
- Dicosmo, F., Misawa, M., Plant cell and tissue culture: Alternatives for metabolite production (1995) *Biotechnology Advances*, 13, pp. 425-453
- Dietzman, G., Khuong, D.V., Bich, T.Q., Cuong, N.M., Soejarto, D.D., GIS (Geographic Information System)-based biodiversity assessment as a tool to support conservation initiatives at Cuc Phuong National Park (2002) *Advances in Natural Sciences*, 3, pp. 255-271
- Dzu, N.V., Hiep, N.T., Loc, P.K., Soejarto, D.D., Little known species and new records on the occurrence of Angiosperm species in Cuc Phuong National Park III. New records of Aroids (Araceae) (2003) *Advances in Natural Sciences*, 4, pp. 1-14
- Eisner, T., Prospecting for nature's chemical riches (1989) *Issues in Science and Technology*, 6, pp. 31-34

- Eisner, T., Chemical prospecting: A proposal for action (1992) Ecology, Economics, and Ethics: The Broken Cycle, pp. 196-202. , F.H. Borhmann S.R. Kellert Yale University Press New Haven, CT
- (1995) Prescribing Guidelines and Establishing a Regulatory Framework for the Prospecting of Biological and Genetic Resources, Their By-Products and Derivatives, for Scientific and Commercial Purposes, and for Other Purposes, pp. 1-10. , http://www.grain.org/brl_files/philippines-bioprospecting-1995-en.pdf, Executive Order 247 Executive Order No. 247, May 18
- Annex to Resolution 8/83. International Undertaking on Plant Genetic Resources (1983) Twenty-Second Session of the FAO Conference, , <ftp://ext-ftp.fao.org/ag/cgrfa/Res/C8-83E.pdf>, Rome
- (2004), <http://www.fic.nih.gov/programs/icbg.html>, International Cooperative Biodiversity Groups (ICBG)Hallock, Y.F., Cragg, G.M., National Cooperative Drug Discovery Group (NCDDGs): A successful model for public private partnerships in cancer drug discovery (2003) Pharmaceutical Biology, 41, pp. 78-91
- Hammond, P.M., The record to date: Described species (1995) Global Biodiversity Assessment, pp. 113-138. , V.H. Heywood R.T. Watson Cambridge University Press Cambridge
- Harshberger, J.W., The purposes of ethnobotany (1896) Botanical Gazette, 21, pp. 146-154
- Hiep, N.T., Loc, P.K., The diversity of the flora of Vietnam. 4. Gardneria Wall. and G. ovata Wall., a new genus and species for the flora (2000) Genetics and Applications, 3, pp. 10-13
- Hiep, N.T., Soejarto, D.D., Loc, P.K., The diversity of the flora of Vietnam 10. Nyctocalos Teijsm. & Binn. (family Bignoniaceae), new genus for flora of Vietnam (2002) Genetics and Applications, 1, pp. 40-43
- (2005) 50 Medicinal Plants Used by Muong People in Cuc Phuong, , Institute of Biotechnology. Associate Program 4, UIC ICBG, Publ., Hanoi (in Vietnamese
- postcard-size loose-bound booklet, fully illustrated)
- (2005) International Society of Ethnobiology Code of Ethics, , <http://guallart.dac.uga.edu/ISE/iseEthics.html>
- (2005), <http://guallart.dac.uga.edu/ISE/iseConstitution.html>, Annex II(2005) ISE Constitution, , <http://www.ethnopharmacology.org/iseConst.html>
- Inside front cover (2005) Journal of Ethnopharmacology 98 (Inside Front Cover)
- Kinghorn, A.D., Farnsworth, N.R., Soejarto, D.D., Cordell, G.A., Swanson, S.M., Pezzuto, J.M., Wani, M.C., Wild, R., Novel strategies for the discovery of plant-derived anticancer agents (2003) Pharmaceutical Biology, 41, pp. 53-67
- Kirakosyan, A., Sirvent, T.M., Gibson, D.M., Kaufman, P.B., The production of hypericins and hyperforin by in vitro cultures of St. John's wort (Hypericum perforatum) (2004) Biotechnology and Applied Biochemistry, 39, pp. 71-81
- Loc, P.K., Do, N.T., Hoan, D.T., Hiep, N.T., Cuong, N.M., Soejarto, D.D., The diversity of the flora of Vietnam 12. Phrynium hainanense T.L. Wu & S.J. Chen (family Marantaceae), new species for flora of Vietnam (2002) Genetics and Applications, 3, pp. 23-26
- Loc, P.K., Hiep, N.T., Soejarto, D.D., Cuong, N.M., The diversity of the flora of Vietnam 17. Anodendron howii Tsiang (Apocynaceae), new species occurrence for the flora (2004) Genetics and Applications, 3, pp. 36-39
- Mays, T.D., Mazan, K.D., Legal issues in sharing the benefits of biodiversity prospecting (1996) Journal of Ethnopharmacology, 51, pp. 93-109
- (2005), http://dtp.nci.nih.gov/branches/gcob/gcob_web3.html, NCI-DTP Website(2003) Third Round Awards Are Announced under Interagency Biodiversity Program, , <http://www.nih.gov/news/pr/dec2003/fic-16.htm>, NIH News
- Penso, G., (1976) Inventory of Medicinal Plants and Compilation of a List of the Most Widely Used Plants, , Geneva, WHO Document DPM/WP/78.2
- Reid, W.A., Laird, S.A., Gamez, R., Sittenfeld, A., Janzen, A.H., Gollin, M.A., Juma, C., A new lease on life (1993) Biodiversity Prospecting: Using Genetic Resources for Sustainable Development, pp. 1-52. , W.A. Reid S.A. Laird C.A. Meyer

R. Gamez A. Sittenfeld D.H. Janzen M.A. Gollin C. Juma World Resources Institute

- Riley, M.C., Traditional Medicine Research Center (TMRC): A potential tool for protecting Traditional and Tribal Medicinal Knowledge in Laos (2001) *Cultural Survival Quarterly*, 24, pp. 21-24
- Rivier, L., Bruhn, J.G., Editorial (1979) *Journal of Ethnopharmacology*, 1, p. 1
- Rosenthal, J.P., Equitable sharing of biodiversity benefits: Agreements on genetic resources (1996) Proceedings of the Cairns Conference, <http://www.fic.nih.gov/programs/oecdub.html>, Presentation at the International Conference on Incentive Measures for the Conservation and the Sustainable Use of Biological Diversity in Cairns, Australia, 25-28 March (The meeting was sponsored and organized by the Organisation for Economic Co-Operation and Development. The paper appears in print form in the publication - Investing in Biological Diversity: OECD 1997
- Rosenthal, J.P., Integrating drug discovery, biodiversity conservation, and economic development: Early lessons in the International Cooperative Biodiversity Groups (1997) *Biodiversity and Human Health*, pp. 281-301. , F. Grifo J. Rosenthal Island Press Washington, DC
- Rosenthal, J.P., Pezzuto, J.M., (1999) *Drug Discovery, Economic Development and Conservation: The International Cooperative Biodiversity Groups*, pp. 1-144. , Swets & Zeitlinger The Netherlands
- Rosenthal, J.P., Beck, D.A., Bhat, A., Biswas, J., Brady, L., Bridbord, K., Collins, S., Siegel-Causey, D., Combining high risk science with ambitious social and economic goals (1999) *Pharmaceutical Biology*, 37, pp. 6-21
- Schippmann, U., Leaman, D.J., Cunningham, A.B., Impact of cultivation and gathering of medicinal plants on biodiversity: Global trends and issues (2002) *Biodiversity and the Ecosystem Approach in Agriculture, Forestry and Fisheries*, http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/005/aa010e/aa010e00.htm, FAO Satellite Event on the Occasion of the Ninth Regular Session of the Commission on Genetic Resources for Food and Agriculture. Rome, 12-13 October (Inter-Departmental Working Group on Biological Diversity for Food and Agriculture, Rome
- Schultes, R.E., Von Reis, S., (1995) *Ethnobotany: Evolution of a Discipline*, Chapman & Hall London
- (2001) *Handbook of the Convention on Biological Diversity*, pp. 3-26. , <http://www.biodiv.org/convention/articles.asp>, Secretariat of the Convention on Biological Diversity Earthscan Publications Ltd., London/Sterling, VA
- Soejarto, D.D., Logistics and politics in plant drug discovery. the other end of the spectrum (1993) *Human Medicinal Agents from Plants*, pp. 98-111. , A.D. Kinghorn M. Balandrin American Chemical Society Washington, DC
- Soejarto, D.D., Biodiversity prospecting and benefit-sharing: Perspectives from the field (1996) *Journal of Ethnopharmacology*, 51, pp. 1-5
- Soejarto, D.D., Gyllenhaal, C., Ashton, P.S., Sohmer, S.H., Plant explorations in Asia under the sponsorship of the National Cancer Institute, 1986-1991: An overview (1996) *Medicinal Plant Resources of the Tropical Forest*, pp. 284-310. , M.J. Balick E. Elisabetsky S.A. Laird Columbia University Press New York
- Soejarto, D.D., Gyllenhaal, C., Fong, H.H.S., Xuan, L.T., Hiep, N.T., Hung, N.V., Bich, T.Q., Pezzuto, J.M., The UIC ICBG (University of Illinois at Chicago International Cooperative Biodiversity Group) Memorandum of Agreement: A model of benefit-sharing arrangement in natural products drug discovery and development (2004) *Journal of Natural Products*, 67, pp. 294-299
- Soejarto, D.D., Gyllenhaal, C., Regalado, J.C., Pezzuto, J.M., Fong, H.H.S., Tan, G.T., Hiep, N.T., Dietzman, G., Studies on biodiversity of Vietnam and Laos: The UIC-based ICBG program (1999) *Pharmaceutical Biology*, 37, pp. 100-113
- Soejarto, D.D., Gyllenhaal, C., Regalado, J.C., Pezzuto, J.M., Fong, H.H.S., Tan, G.T., Hiep, N.T., Dietzman, G., An international collaborative program to discover new drugs from tropical biodiversity of Vietnam and Laos (2002) *Natural Product Science*, 8, pp. 1-15
- Soejarto, D.D., Gyllenhaal, C., Tarzian Sorensen, J.A., Fong, H.H.S., Xuan, L.T., Binh, L.T., Hiep, N.T., Pezzuto, J.M.,

- Bioprospecting arrangement: Experiences between the north and the south (2004) Handbook of Best Practices for Management of Intellectual Property in Health Research and Development, pp. 169-190. , R. Mahoney Centre for the Management of Intellectual Property in Health Research and Development, MIHR Oxford, UK
- Soejarto, D.D., Hiep, N.T., Loc, P.K., Bien, L.K., Dai, T.D., Regalado, J.C., Cuong, N.M., Little known species and new records on the occurrence of angiosperm species in Cuc Phuong National Park. 1. *Heliciopsis lobata*, *Alangium tonkinense*, *Illigera parviflora*, *Keenania tonkinensis*, *Lysimachia insignis*, and *Kadsura coccinea* (2002) *Advances in Natural Sciences*, 3, pp. 57-70
 - Soejarto, D.D., Hiep, N.T., Loc, P.K., Cuong, N.M., Bien, L.K., Dai, T.D., Kadushin, M.R., Seed Plants of Cuc Phuong National Park, Vietnam (2004) A Documented Checklist, pp. i-xxxiv. , Cuc Phuong National Park, Ninh Binh, Vietnam. Agricultural Publishing House, Hanoi, Vietnam, (plates I-XCIX)
 - Soejarto, D.D., Regalado, J.C., Dietzman, G., Gyllenhaal, C., Hiep, N.T., Loc, P.K., Huong, N.T., Cuong, N.M., Development and management of a computerized database of seed plants of Cuc Phuong National park (2001) *International Workshop on Biology (Workshop Proceedings)*, Vol. 1, pp. 192-195. , Hanoi (Vietnam), 2-5 July
 - Soejarto, D.D., Regalado, J.C., Hiep, N.T., Loc, P.K., Bien, L.K., Bich, T.Q., Cuong, N.M., Kadushin, M.R., (2002) *Atlas of Seed Plants of Cuc Phuong National Park*, , <http://uic-icbg.pharm.uic.edu>, online, posted starting in 2002
 - Soejarto, D.D., Xuan, L.T., Vu, B.M., Dac, L.X., Bich, T.Q., Southavong, B.H., Sydara, K., Hung, N.V., Implementing IPR and benefit-sharing arrangements: Experiences in the University of Illinois at Chicago-Vietnam-Laos ICBG (2002) *Intellectual Property Rights and Traditional Knowledge on Genetic Resources in Pharmaceutical and Cosmetic Business*, JBA/NITE, International Symposium 2002, pp. 47-83. , 14 November, Tokyo, Japan
 - (2003) *Bulletin on Lao Traditional Medicine #5*, , Published by Traditional Medicine Research Center, Ministry of Health, Vientiane, Laos (in Lao language, Bulletin started in 2001)
 - Vu, B.M., Xuan, L.T., Hai, N.V., Soejarto, D.D., (2002) *Vietnam Agriculture*, 87, p. 16. , ICBG Associate Program 4 and Buffer Zones of Cuc Phuong National Park (in Vietnamese)
 - Vu, B.M., Xuan, L.T., Hai, N.V., Soejarto, D.D., An ICBG/AP4-created model of household economic development for a commune in buffer zone of Cuc Phuong National Park (2002) *Journal of Economic Development Review*, 59, pp. 1-3
 - Wender, P.A., Hinkle, K.W., Koehler, M.F., Lippa, B., The rational design of potential chemotherapeutic agents: Synthesis of bryostatin analogues (1999) *Medical Research Review*, 19, pp. 388-407
 - Wilson, E.O., The current state of biological diversity (1988) *Biodiversity*, pp. 3-18. , E.O. Wilson F.M. Peter National Academy Press Washington, DC
 - Wright, A.D., Konig, G.M., Angerhofer, C.K., Greenidge, P., Linden, A., Antimalarial activity: The search for marine-derived natural products with selective antimalarial activity (1996) *Journal of Natural Products*, 59, pp. 710-716
 - Zhang, H.J., Hung, N.V., Cuong, N.M., Soejarto, D.D., Pezzuto, J.M., Fong, H.H.S., Tan, G.T., Natural anti-HIV constituents from *Litsea verticillata* *Planta Medica*, , in press
 - Zhang, H.-J., Qiu, S.-H., Tamez, P., Tan, G.T., Aygdomus, Z., Hung, N.V., Cuong, N.M., Fong, H.H.S., Antimalarial agents from plants II. Decursivine, a new antimalarial indole alkaloid from *Rhaphidophora decursiva* (2002) *Pharmaceutical Biology*, 40, pp. 221-224
 - Zhang, H.J., Tamez, P., Aydogmus, Z., Tan, G.T., Saikawa, Y., Hashimoto, K., Nakata, M., Fong, H.H.S., Antimalarial agents from plants. III. Trichothecenes from *Ficus fistulosa* and *Rhaphidophora decursiva* (2002) *Planta Medica*, 68, pp. 1088-1091
 - Zhang, H.-J., Tamez, P.A., Hoang, V.D., Tan, G.T., Hung, N.V., Xuan, L.T., Cuong, N.M., Pezzuto, J.M., Antimalarial compounds from *Rhaphidophora decursiva* (2001) *Journal of Natural Products*, 64, pp. 772-777
 - Zhang, H.-J., Tan, G.T., Hoang, V.D., Hung, N.V., Cuong, N.M., Soejarto, D.D., Pezzuto, J.M., Fong, H.H.S., Natural anti-HIV agents. Part III. Litseaverticillols A-H, novel sesquiterpenes from *Litsea verticillata* (2003) *Tetrahedron*, 59, pp. 141-148

