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BORN 1942, Republic of Panama (US citizenship, 1978)

EDUCATION

1962, Agronomist, PanAmerican Agricultural School, Honduras, C.A.
1965, B.S., Entomology, University of Florida, Gainesville, FL
1967, M.S.; 1971, Ph.D., Entomology, University of Florida, Gainesville, FL

PROFESSIONAL EXPERIENCE

1971-72. Post-Doctorate, Department of Botany, University of Florida. Research on primary productivity of Everglades' mangroves.

1972-73. Professor, Department of Entomology, National Graduate School of Agriculture, Chapingo, Mexico.

1973-76. Senior Scientist, Lockheed Electronics Co., Life Sciences Applications Dept., Veracruz, Mexico and Johnson Space Center, Houston, TX. Research commissioned by NASA on the application of remote sensing technology in the screwworm eradication program; coordinated activities at remote sensing site in Veracruz, Mexico. Transferred to the NASA Johnson Space Center, Houston, TX; continued working on the screwworm project, and in the Large Area Crop Inventory Experiment (LACIE).

1976-79. Research Entomologist, Department of Entomology, Texas A&M. Assigned to the USDA/AR Screwworm Research Lab., Mission, TX. Conducting research on screwworm biology, ecology and control in support of the eradication programs in SW USA, Mexico and 2nd eradication from Curaçao, N.A.

1979-2000. Asst. Prof. (1979-81); Assoc. Prof. (1981-1987); Full Professor (1987-Present). Department of Entomology, Kansas State University.

CURRENT POSITION DESCRIPTION

Overall research responsibilities fall under the descriptive title of "Ecology, Biology, and Control of Insects Affecting Man and Animals". Major research interests are with flies of veterinary importance, especially stable flies (*Stomoxys calcitrans*), face flies (*Musca autumnalis*), house flies (*M. domestica*), and horn flies (*Haematobia*

irritans). Studies with stable flies include their short and long distance dispersal or migration; their feeding mechanism (functional morphology of mouthparts) and saliva properties and functions; attractancy and trapping with Alsynite plastic; breeding habitats and populations under urban environments; how their presence in urban areas creates conflicts between urbanites and livestock producers; and sources of these flies affecting pastured cattle. Research with face flies includes the adaptive significance of puparial calcification; various behavioral components of diapause, including survival and feeding during diapause; selection of hibernacula. Related fly studies include the oviposition behavior of parasites of filth flies; health hazards of electrocutor insect traps ("bug zappers") due to the production of airborne insect particles and how these particles are capable of carrying bacteria and viruses. Research on the cat flea comprises trapping, insecticide resistance, dynamics of the carpet microhabitat, evaluation of control strategies, and the role of urban wildlife as cat flea reservoirs. Currently investigating the biology of the itch mite *Pyemotes herfsi*, an introduced species from Europe and the cause of bite outbreaks on humans throughout the Midwestern U.S. Taught (1979-2003) an undergraduate course in Veterinary Entomology and a companion lab course, as a service course for Animal Sciences and Industry, and Pre-Vet majors.

MAJOR RESEARCH ACOMPLISHMENTS (collaborators within parenthesis)

- Member of team that discovered the elusive mating sites of wild screwworm flies and described the flies' behavior at these sites (F. Guillot & H.E. Brown)
- Designed trap for screwworm flies which was 9X more effective than existing traps; trap used in eradication of screwworms throughout SW U.S., Mexico, Central America and from an introduction into Libya (J. Goodenough & J. Coppedge)
- Member of team that developed a poisoned bait system for screwworm flies to aid on this pest's eradication; evaluated this technique's success in the 2nd eradication of these flies from the island of Curacao (J. Coppedge, J. Goodenough, W. Snow)
- Described the biological significance (mating stimulant) of the attractant Swormlure-2 for screwworms
- Led efforts that described the unique calcification process of face fly puparia (M. Grodowitz, T. Hopkins, K. Kramer, R. Elonen)
- Described the morphology and function of mouthparts of flies in 35 Diptera families (R. Elzinga)
- Showed that horn flies disperse at a high rate among cattle herds (R. Byford)
- Designed a new trap for stable flies which has become the standard trap for this species
- Found that cat fleas can become serious pests of stabled cattle (M. Dryden & W. Moore)
- Documented that composting and mulching with grass clippings in city backyards are significant sources of stable flies in urban environments; and that more stable flies are found in backyards with dogs than in those without
- Demonstrated that the great quantities of airborne particles produced during the operation of electrocutor insect traps are composed of insect body components and elements from the electrified grid

- Developed (and patented) a highly efficient light trap for cat fleas (M. Dryden & K. Hampton)
- Demonstrated that bacteria and viruses carried by insects are made airborne when the insects are killed by electrocutor traps (J. Urban)
- Member of team that developed methods for using near infrared spectroscopy to identify fly puparia parasitized by microhymenopteran parasites, to chronologically age-grade flies, and to sex fly pupae (F. Dowell, J. Perez, J. Throne, J. Baker)
- Collaborated in efforts that demonstrated that salivary gland extracts of stable flies modulate bovine lymphocyte responses (M. Wilkerson & M. Kanost)
- Recently gathered evidence that supports the hypothesis of long distance migration of stable flies into the U.S. Midwest in the spring (J. Hogsette)
- Has demonstrated the high level of movement of stable flies between rural and urban habitats by the identification of bloodmeal hosts, as well as the high rate of interrupted feeding (various graduate students)
- Has recently demonstrated that larval habitats of wasted hay mixed with manure and soil at winter feeding sites of hay in round bales are the main sources of stable flies attacking pastured cattle (J. Hogsette, L. Zurek, J. Talley)
- Demonstrated that house flies colonize fresh cattle manure and for up to 3 weeks; whereas, stable flies do not colonize it until the manure is at least 10 days old and do so for just a short time (S. Haas).
- Improved the bioassay for evaluating insecticide resistance in cat fleas; found that the pupation site in carpets is a function of the carpet matrix. Also demonstrated that the urban wildlife, specially raccoons and opossums, serve as reservoirs of cat fleas during the winter months when the fleas disappear from the pets and home environments (M. Dryden, R. Miller & R. Bossard)
- Demonstrated that parasitic wasps use olfactory stimuli to locate their fly pupal hosts, and that these wasps avoid superparasitizing their pupal hosts as they can distinguish between their own marking pheromone and that of conspecifics (T. McKay)
- Has recently obtained evidence that indicate that the adaptive significance of puparial calcification of face flies might be to prevent oviposition by microhymenopteran parasitoids. In addition, has constructed an ethogram of the oviposition behavior of *Muscidifurax zaraptor*, one of these microhymenopteran parasitoids (various graduate students)
- Coordinated efforts in the surveillance of West Nile virus in Kansas during 2001, 2002, 2003, and 2004 which included the trapping and identification of mosquitoes throughout the state, the state-wide collection of dead birds, the operation of a toll free phone for reporting dead birds, and the maintenance of a web page with the latest information on the WNV in the state of Kansas (L. Zurek)
- Led interdisciplinary and interagency team that discovered that the cause of outbreaks of mysterious bites on humans in the USA Midwest is an introduced species of *Pyemotes* itch mites (personnel from K-State, Univ. of Nebraska, Pittsburg State Univ., CDC and KDHE)

GRADUATE STUDENT ADVISING

Adviser for 10 undergraduate students (while dept. had an undergraduate program).
Major professor for 12 M.S. and 10 Ph.D. students (graduates currently holding posts with the U.S. Armed Forces, universities, state and foreign governmental agencies, industry, or pursuing further education):

In addition, has been member of 36 M.S. and Ph.D. supervisory committees in Entomology and other departments.

Currently, major professor for 2 Ph.D. students.

SERVICE TO COLLEGE, UNIVERSITY AND PROFESSIONAL SOCIETIES

Member of numerous College committees, including Relations with other Educational Institutions, Course & Curriculum, Pest Science & Management, Search Committees for various professors, Head, and two Deans; Ag Awards

Member of numerous University committees, including International Activities Council, Multicultural Affairs, Latin American Studies Program, Faculty Senate, Graduate Council, Graduate Council Recertification Advisory Comm., Search Assoc. Provost

Member of various National Committees, including Executive Coordinating Comm. 2nd Nat'l. Livestock IPM workshop; Comm. Annual Livestock Insect Workers Conference; NC154, NCS-3, S-274 and S-1005 Regional Committees

Member and Chair of Editorial Board of Annals Entomol. Soc. Amer.; judge of student competition at national meetings; Assoc. Editor, Southwestern Entomologist

AWARDS AND HONORS

Award for Excellence in Graduate Research, Univ. of Florida. 1971.

USDA/SEA Superior Service Award. 1979.

President, Central States Entomological Society. 1981-82.

President, Sigma Xi Society, KSU Chapter. 1990-91.

Schering-Plough Lifetime Achievement in Veterinary Entomology Award

HONORARY AND PROFESSIONAL SOCIETIES

Entomological Society of America; Central States (Kansas)

Entomological Society; Sigma Xi; Phi Sigma Society

PRESENTATION OF SCHOLARLY WORK

Numerous presentations of research papers at regional, national and international venues, including invited papers at these meetings. Examples include:

-Symposia at national meetings of the Entomological Society of America, the International Symposia on Ectoparasites of Pets, Society for Vector Ecology, Livestock Insects Workers Conferences

-Smithsonian Tropical Res. Inst., Balboa, Panama, on "Ecological implications of the eradication of the screwworm fly from Central America and Panama".

- Invited talk on the eradication of the screwworm at the V Agro-Scientific Congress, Univ. of Panama
- Invited seminar on “The use of insecticides: The pros and the cons”, Panama Canal Zone Audubon Society
- Various presentations at the Nebraska Urban Pest Management Conference on “Insect Electrocutors as Sources of Insect Fragments in the Commercial Work Environment”, “New Developments in Flea Research in Kansas”, “The Stable Fly: A Common Pest of Dogs and Humans, and Possible Health Threat”
- Mechanism of Calcification of face Fly Puparia-Invited talk at the 5th Minority Graduate Education Conference on “Minorities in Science and Technology” (Wichita, KS)
- Organizer of four “Kansas Vector-Borne Disease Prevention Conference”
- “Unusual Urban Pests: Face Fly and Stable Fly”, invited talk at the USDA/ARS CMAVE, Gainesville, FL
- “The human bot fly among ecotourists”, talk at the Dept. of Dermatology, Univ. of Kansas Medical Center, Kansas City
- Diverse talks/seminars presented at departments of entomology at the universities of Kansas, Florida, Nebraska, Missouri, Arkansas
- Various talks at the International Symposia on Ectoparasites of Pets-Invited talks on horn flies as pests of cattle, and on latest findings on cat fleas as pests of the home environment, at the XVII PanAmerican Veterinary Sciences Congress

REFEREED PUBLICATIONS

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- ◆Cromroy, H.L., R. Levy, A.B. Broce & L. Goldman. 1971. Radio-sensitivity of animal species. In: Symposium on Nuclear Warfare and Agricultural and Livestock Production. D.W. Bensen, and A.H. Sparrow, Eds. p. 419-433.
- ◆Federici, B. & A.B. Broce. 1971. Graduate training in Entomology: Departments of Entomology in School or Colleges of Agriculture. Bull. Entomol. Soc. Amer. 17:255-258.
- ◆Lugo, A.E., G. Evink, M.M. Brinson, A.B. Broce & S.C. Snedaker. 1975. Diurnal rates of photosynthesis, respiration, and transportation in mangrove forests in South Florida. In: Tropical Ecological Systems: Trends in terrestrial and aquatic research. -F.B. Golley & E. Medina, Eds. pp 335-350. Springer-Verlag, N.Y.
- ◆Olarte E., W., R. Reyna, P. Ittycheriah, A. Castillo, and A.B. Broce. 1974. Toxic and sterilizing effects of some combinations of apholate and tepa on *Musca domestica* (L.). Agrociencia. 18:15-26.
- ◆Broce, A.B. & J. Ideker. 1978. Oleander flowers as insect traps. Ann. Entomol. Soc. Amer. 71:628-629.
- ◆Broce, A.B., J.L. Goodenough & J.R. Coppedge. 1977. A wind oriented trap for screwworm flies. J. Econ. Entom. 70:413-416.

- ◆ Guillot, F.S., H.E. Brown & A.B. Broce. 1978. Behavior of sexually active male screwworm flies. *Ann. Entomol. Soc. Amer.* 71:199-201.
- ◆ Coppedge, J.R., A.B. Broce, F.H. Tannahill, J.L. Goodenough, J.W. Snow & M.M. Crystal. 1978. Development of a bait system for suppression of adult screwworms. *J. Econ. Entomol.* 71:483-486.
- ◆ Coppedge, J.R., J.L. Goodenough, A.B. Broce, F.H. Tannahill, J.W. Snow, M.M. Crystal & H. D. Petersen. 1978. Evaluation of the screwworm adult suppression system (SWASS) on the island of Curacao. *J. Econ. Entomol.* 71:579-584.
- ◆ Broce, A.B., R.B. Davey & J.W. Snow. 1979. Plastic wicks as dispensers of the screwworm attractant, Swormlure-2. *J. Econ. Entomol.* 72:115-118.
- ◆ Broce, A.B., J.L. Goodenough & J.W. Snow. 1979. Recovery of screwworm flies released at various distances and directions of the attractant Swormlure-2. *Environ. Entomol.* 8:824-828.
- ◆ Broce, A.B. 1979. Sexual behavior of screwworm flies stimulated by Swormlure-2. *Ann. Entomol. Soc. Amer.* 73:386-389.
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- ◆ Byford, R.L., A.B. Broce, J.A. Lockwood, S.M. Smith, D.G. Morrison, & C.P. Bagley. 1987. Horn fly (Diptera: Muscidae) dispersal among cattle herds. *J. Econ. Entomol.* 80:421-426.
- ◆ Grodowitz, M.J., A. Broce & L.H. Harbers. 1987. Characteristics of dung that affect *Musca autumnalis* (Diptera: Muscidae) larval survival and puparial mineralization. *Environ. Entomol.* 16:722-730.
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- ◆Urban, J.E. & A.B. Broce. 1998. Flies and their bacterial loads in greyhound dog kennels in Kansas. *Current Microbiology.* 36:164-170.
- ◆Jones, C.J., J.A. Hogsette, S.A. Isard, Y.J. Guo, G. Greene & A.B. Broce. 1998. Using phenology to detect dispersal of stable flies in Western Kansas. 13th Conf. On Biometeorol. & Aerobiol., Amer. Meteor. Soc.
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- ◆ Urban, J.E. & A.B. Broce. 2000. Killing of flies in electrocuting insect traps releases bacteria and viruses. *Current Microbiology.* 41:267-270.
- ◆ Dryden, M. & A. Broce. 2000. Susceptibility of fleas to control agents: Development of a monitoring program. *Comp. on Cont. Educ. Pract. Vet.* 22:21-23.
- ◆ Miller, R., M. Dryden, A. Broce & A. Suiter. 2000. Pupation site selection of cat fleas (Siphonaptera: Pulicidae) in various carpet types and its influence on insecticide efficacy. *J. Econ. Entomol.* 93:1391-1397.
- ◆ Dowell, F.E., A.B. Broce, F. Xie, J.E. Throne & J.E. Baker. 2000. Detection of parasitized fly puparia by near-infrared spectroscopy. *J. Near Infrared. Spectr.* 8: 259-265.
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LETTERS TO THE EDITOR

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Alberto Broce. Letter to the editor. *Playboy*, May 1995:41.

PATENT

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