

PATRICIA ANN FAIL (NODEN), Reproductive Biologist

PROFESSIONAL EXPERIENCE

November 1990 to date. Manager, Department of Reproductive Biology, Center for Life Sciences and Toxicology, Chemistry and Life Sciences, Research Triangle Institute, Post Office Box 12194, Research Triangle Park, NC 27709. Additional responsibilities beyond that listed below include coordination of group activities, administrative reporting, and decisions on group direction.

January 1986 to November 1990. Senior Reproductive Biologist/Toxicologist, Center for Life Sciences and Toxicology, Chemistry and Life Sciences, Research Triangle Institute, Post Office Box 12194, Research Triangle Park, NC 27709. Contract research and testing in reproductive toxicology and endocrinology for industrial, governmental, and university clients, which include: endocrinopathy after drug treatment (Principal Investigator); performing reproductive assessment by Continuous Breeding Protocol in rodents exposed to potential toxicants (Co-Principal Investigator); development of male contraceptive agents (Co-Investigator); basic research on control of sexual maturation in male deer mice; and genetic models of infertility and receptor binding and bioassay of antiprogesterational activity. Collaborative research on social stimulation of testicular function in ring doves and endocrinology of reproductive function in prosimian primates. Responsible for contract administration, proposal development, protocol design, writing of Standard Operating Procedures, literature summaries, interim and final reports, and manuscripts for refereed journals, training and supervision of personnel, and supervision of chemical handling and dosage formulation. Studies conform to FDA and EPA guidelines and adhere to Good Laboratory Practices (GLP) regulations.

1987 to date. Visiting professor for minority institutions, sponsored by FASEB. Once or twice yearly, perform workshops and seminars on some aspect of reproduction or toxicology.

1984 to 1989. Research Associate, Department of Psychology, Duke University, Durham, NC. Research Consultant on reproductive endocrinology to study social stimulation of testicular function in ring doves and pubertal development of prosimian primates.

1980 to 1985. Assistant Professor of Physiology and Zoology, North Carolina State University, Raleigh, NC. Taught Veterinary Physiology, Special Topics in Physiology of Pregnancy, Histology, Comparative Physiology, and Vertebrate Physiology. Developed a research program on environmental and pituitary control of pubertal development of male rodents, hormonal regulation of prostaglandin synthesis at parturition; graduate training and undergraduate research.

1978 to 1980. Research Associate, Department of Obstetrics, Gynecology and Reproductive Biology, Michigan State University, East Lansing, MI. Planned, organized, and directed research projects in lipid metabolism in perinates of mothers with diabetes, prostaglandin-forming cyclooxygenase formation by tissues of gestation in rabbits; planned and developed blood chemistry and endocrine laboratory.

1975; 1977 to 1978. Assistant Professor and Instructor, Science Department, Lansing Community College, Lansing, MI. Taught Human Anatomy, Human Physiology, and Human Sexuality. Coordinated seven sections of Human Anatomy.

1976 to 1977. Research Associate, Kliniek Verloskunde, Gynaekologie en KI (Clinic of Veterinary Obstetrics, Gynecology and Artificial Insemination), Rijksuniversiteit te Utrecht, The Netherlands. Research on steroidogenesis in *in vitro* follicle cultures, purification of equine pituitary hormones, and induction of abortion in horses.

1970 to 1975. Research and Teaching Assistant, Department of Dairy Science and Physiology, Michigan State University, East Lansing, MI. Taught Dairy Science, Animal Reproduction, Human Physiology, and Biological Sciences Laboratories. Conducted research on ovulation control and reproductive endocrinology of horses, influence of vasoligation on sperm production in rats, radioimmunoassay development, and *in vitro* pituitary monolayer response to releasing hormones.

1966 to 1970. High School Teacher, Science Department, Sanger High School, Sanger, CA. Taught Biology, General Science, and General Mathematics.

1965 to 1966. Histological Research Technician. Experimental pathology, National Aeronautics and Space Administration, Moffett Field, CA. Performed histologic techniques (both routine and developmental) on nerve and brain tissue.

1963 to 1965. Research Assistant and Histological Technician, Zoology Department, Kansas State University, Manhattan, KS. Assisted in Human Anatomy and Embryology Laboratories; MS research on embryology of bovine heart; fixed, sectioned, and stained reproductive tissues; serial sectioned bovine and canine embryos.

EDUCATION

B.S., Kansas State University, Zoology (Embryology), 1964
M.S., Kansas State University, Zoology (Embryology), 1966
– Fresno State University, Psychology and Biology, 1968 (teaching certificate)
Ph.D., Michigan State University, Physiology and Dairy Science, 1975

HONORS

Mary Barnes Scholarship, 1960-1962
Friedline Scholarship, 1962-1964
Kansas Heart Association Grant-in-Aid, 1964-1965
Phi Delta Gamma (Graduate Honorary), 1965
Graduate Office Scholarship Award, 1973
Excellence in Teaching Award Nominee, 1974

PROFESSIONAL SOCIETIES

American Physiological Society
American Society of Andrology
Association for Study of Animal Science
North Carolina Society of Toxicology
Sigma Xi
Society for Study of Reproduction

DISSERTATIONS

P. A. Noden, Cardiogenesis in the Bovine to 35 Somites, Masters Thesis, Kansas State University, 1965.

P. A. Noden, Estrus, Ovulation and Changes in Some Hormones During the Estrus Cycle of Mares and After Prostaglandin $F_{2\alpha}$ Ph.D. Dissertation, Michigan State University, 1975.

PUBLICATIONS

Ibrahim, M.Z.M., N. Call, and P. Noden (1968). Modifications of the Hortega silver carbonate method adapted for celloidin-embedded and frozen sections, *Acta Neuropath.*, 10, 258-260.

Haymaker, W., M.Z.M. Ibrahim, J. Miquel, N. Call, P. Noden, W. Ashly, E.R. Ballinger, J. Ghidoni, I.R. Lindsay, A.J. Behar, and G. Baker (1972). Acute changes in the central nervous system of monkeys exposed to protons, *J. Neuropath. Exp. Neurol.*, 31, 72-101.

Hafs, H.D., T.M. Louis, P.A. Noden, and W.D. Oxender (1974). Control of the estrous cycle with prostaglandin $F_{2\alpha}$ in cattle and horses, *J. Anim. Sci.*, 38, Suppl. I, 10-21.

Hafs, H.D., W.D. Oxender, P.A. Noden, and R.P. Amann (1974). Testicular function in bulls 10 weeks after unilateral vasectomy, *J. Anim. Sci.*, 38, 117-120.

Noden, P.A., W.D. Oxender, and H.D. Hafs (1974). Estrus, ovulation, progesterone, and lutenizing hormone after prostaglandin $F_{2\alpha}$ in mares, *Proc. Soc. Exp. Biol. Med.*, 145, 145-105.

Oxender, W.D., P.A. Noden, T.M. Louis, and H.D. Hafs (1974). A review of prostaglandin $F_{2\alpha}$ for ovulation control in cows and mares, *Amer. J. Vet. Res.*, 35, 997-1001.

Lin, Y.C., P.A. Noden, W.D. Oxender, and H.D. Hafs (1975). Androgens in the bovine fetus and dam, K. Mongkonpunya, *Proc. Soc. Exp. Biol. Med.*, 148, 489-493.

Noden, P.A., W.D. Oxender, and H.D. Hafs (1975). The cycle of oestrus, ovulation and plasma levels of hormones in the mare, *J. Reprod. Fertil.*, 23, 189-192.

Oxender, W.D., P.A. Noden, D.L. Bolenbaugh, and H.D. Hafs (1975). Control of estrus with prostaglandin $F_{2\alpha}$ in mares: minimal effective dose and stage of estrous cycle, *Am. J. Vet. Res.*, 36, 1145-1147.

Oxender, W.D., P.A. Noden, and H.D. Hafs (1975). Oestrus, ovulation and plasma hormones after prostaglandin $F_{2\alpha}$ in mares, *J. Reprod. Fertil.*, 23, 251-255.

Oxender, W.D., and P.A. Noden (1976). Can artificial lights be used to initiate estrus and ovulation in mares? *Quarter Horse Journal*, 28, 34-38.

Oxender, W.D., and P.A. Noden (1976). Photoperiod initiation of estrus and ovulation in seasonally anestrous mares, *Proc. VIII International Congress on Animal Reproduction and Artificial Insemination*, Cracow, Poland, Vol. III, 160-164.

Oxender, W.D., P.A. Noden, and H.D. Hafs (1977). Prostaglandins for horses, *Quarter Horse Journal*, 29, 116-117.

Britt, J.H., P.A. Noden, and R.S. Emery (1977). Teaching dairy science to a heterogeneous group of students at Michigan State University, *J. Dairy Sci.*, 60, 832-835.

Oxender, W.D., P.A. Noden, and H.D. Hafs (1977). Estrus, ovulation and serum progesterone, estradiol and LH concentrations in mares after an increased photoperiod during winter, *Am. J. Vet. Res.*, 38, 203-207.

Oxender, W.D., P.A. Noden, and M.C. Pratt (1977). Serum lutenizing hormone, estrus and ovulation in mares following treatment with prostaglandin $F_{2\alpha}$ and gonadotropin-releasing hormone, *Am. J. Vet. Res.*, 38, 649-653.

Oxender, W.D., and P.A. Noden (1978). Can hormones be used to cause ovulation in mares? *Quarter Horse Journal*, 30, 36-37.

Noden, P.A., W.D. Oxender, and H.F. Hafs (1978). Early changes in serum progesterone, estradiol and LH during prostaglandin $F_{2\alpha}$ -induced luteolysis in mares, *J. Anim. Sci.*, 47, 666-671.

Noden, P.A., W.D. Oxender, and H.D. Hafs (1978). Plasma lutenizing hormone, progestogens and estrogens in mares during gestation, parturition and first postpartum estrus (foal estrus), *Am. J. Vet. Res.*, 39, 1964-1967.

Noden, P.A., W.L. Smith, D.L. DeWitt, and J.F. Roux (1981). Prostaglandin forming cyclooxygenase activity in rabbit amnion, yolk sac, splachnopleure, placenta, decidua and uterus at 20 to 30 days gestation, *Biol. Reprod.*, 24, 1042-1047.

van Leeuwen, W., P.A. Noden, and S.J. Dieleman (1983). Induced abortion with two prostaglandin $F_{2\alpha}$ analogues in mares: plasma progesterone changes, *Veterinary Quarterly*, 5, 97-100.

Lepri, J.J., and P.F. Noden (1984). Reproductive function is independent of photoperiod in adult male *Microtus pinetorum*, *J. Mammology*, 65, 696-697.

Whitsett, J.M., P.F. Noden, J. Cherry, and A.D. Lawton (1984). Effect of transitional photoperiods on testicular development and puberty in male deer mice (*Peromyscus maniculatus*), *J. Reprod. Fertil.*, 72, 277-286.

Stroud, C.M., P.F. Noden, and J.M. Whitsett (1985). Bromoergocryptine decreases serum prolactin and delays sexual maturation in male golden hamsters, *Biol. Reprod.*, 32, 1191-1199.

Kunze, D.J., and P.F. Noden (1986). The effect of flunixin meglumine on levels of prostaglandins E₂ and F in the pony following endotoxin administration, J.N. Moore, N.A. White, and J.L. Becht (eds.). IN: *Proceedings of the Second Colic Symposium*, Vol. 2, Veterinary Learning Systems, Lawrenceville, NJ, pp. 233-234.

Fail, P.A., and R.P. Reynolds (1987). Influence of cortisol on prostaglandin synthesis by fetal membranes, placenta and uterus of pregnant rabbits, *Biol. Reprod.*, 37, 47-54.

Fail, P.A., and J. Whitsett (1988). Influence of photoperiod, ambient temperature and melatonin on testosterone synthesis and release during reproductive maturation in male deer mice, *J. Andrology*, 9, 21-30.

Izard, M.K., and P.A. Fail (1988). Progesterone levels during pregnancy in the greater thick-tailed galago (*Galago crassicaudatus*), *J. Med. Primatology*, 17(3), 125-133.

Fail, P.A., J.D. George, H.R. Sauls, S.W. Dennis, and J.C. Seely (1989). Effect of boric acid on reproduction and fertility of rodents, *Adv. Contra. Deliv. Syst.*, 5(3/4), 323-333.

Fail, P.A., J.D. George, J.C. Seely, T.B. Grizzle, and J.J. Heindel (1991). Reproductive toxicity of boric acid in Swiss (CD-1®) mice: assessment using the continuous breeding protocol, *Fund. Appl. Tox.*, 17, 225-239.

Perry, J.M., M.K. Izard, and P.A. Fail (1991). Observations in reproductive hormones, copulatory behavior, and neonatal mortality in captive *Lemur mongoz* (mongoose Lemur), *Zoo. Biol.*, 11, 81-97.

Cook, C.E., M.C. Wani, Y.W. Lee, P.A. Fail, and V. Petrow (1992). A striking reversal of activity profile: analogs of RU 486 with strong progestational (agonist) activity, *Life Sciences*, 52, 155-162.

Chapin, R.E., D.K. Gulati, P.A. Fail, E. Hope, S.R. Russell, J.J. Heindel, J.D. George, T.B. Grizzle, and J.L. Teague (1993). The effects of feed restriction on reproductive function in Swiss CD-1 mice, *Fund. Appl. Tox.*, 20, 15-22.

Grizzle, T.B., J.D. George, P.A. Fail, J.C. Seely, and J.J. Heindel (1994). Reproductive effects of 4-vinylcyclohexene in Swiss CD-1® mice assessed by a continuous breeding protocol, *Fund. Appl. Tox.*, 22, 122-129.

Cook, C.E., Y.-W. Lee, M.C. Wani, P.A. Fail, and V. Petrow (1994). Effects of D-ring substituents on antiprogestational (antagonist) and progestational (agonist) activity of 11 β -aryl steroids. IN: *Progesterone Antagonists in Reproductive Medicine and Oncology*, H.M. Beier and I.M. Spitz (eds.), Human Reproduction Volume 9, Supplement 1, June 1994, Oxford University Press, pp. 32-39.

Heindel, J.J., R.E. Chapin, D.K. Gulati, J.D. George, L.H. Barnes, P.A. Fail, and R.S.H. Yang (1994). Assessment of the reproductive toxicity of pesticide/fertilizer mixture in mice based on confirmed pesticide contamination in California and Iowa groundwater, *Fund. Appl. Tox.*, 22, 605-621.

Grizzle, T.B., J.D. George, P.A. Fail, and J.J. Heindel (1995). Carisoprodol: reproductive assessment by continuous breeding in Swiss mice, *Fund. Appl. Tox.*, 24, 132-139.

Fail, P.A., S.A. Anderson, S.W. Pearce, H.R. Sauls, and R.P. Reynolds (submitted). Endocrine toxicity of nickel: effects on prolactin, thyroxin, and progesterone in rodents after subchronic exposure to nickel chloride in drinking water, *Toxicol. Appl. Pharm.*

Cook, C.E., M.C. Wani, J.M. Jump, Y.-W. Lee, P.A. Fail, S.A. Anderson, Y.-Q. Qu, and V. Petrow (1995). Structure-activity studies of 2,3,4,4a,5,9b-hexahydroindeo[1,2-c]pyridines as antispermatic agents for male contraception, *J. Med. Chem.* (in press).

Fail, P.A., H.R. Sauls, and S.A. Anderson (in preparation). Testicular response to gonadotropin after boric acid treatment in rodents, *Fund. Appl. Tox.*

George, J.D., P.A. Fail, T.B. Grizzle, and J.J. Heindel (in preparation). Nitrofurazone: reproductive assessment by continuous breeding in Swiss mice, *Fund. Appl. Tox.*

Fail, P.A., J.D. George, T.B. Grizzle, and J.J. Heindel (in preparation). Formamide and dimethylformamide: reproductive assessment by continuous breeding in Swiss mice, *Fund. Appl. Tox.*

ABSTRACTS

Noden, P.A., H.D. Hafs, and W.D. Oxender (1973). Progesterone, estrus and ovulation after prostaglandin F_{2 α} in horses, *Abst. Fed. Proc.*, 32: 229.

Noden, P.A., W.D. Oxender, and H.D. Hafs (1973). LH after PGF_{2 α} in mares, *J. Anim. Sci.*, 37: 323.

Noden, P.A., W.D. Oxender, and H.D. Hafs (1975). Estradiol, estrone and androstenedione after prostaglandin F_{2 α} (PGF_{2 α}) in mares, *Abst. Fed. Proc.*, 34: 316.

Noden, P.A., W.D. Oxender, and H.D. Hafs (1975). Mare LH and progesterone during gestation/foaling, *J. Anim. Sci.*, 41: 372.

Oxender, W.D., and P.A. Noden (1976). Photoperiod induced estrus in anestrus mares, *J. Anim. Sci.*, 42: 1359.

Noden, P.A., and W.D. Oxender (1976). LH and ovulation after GnRH in mares, *J. Anim. Sci.*, 42: 1360.

Oxender, W.D., and P.A. Noden (1976). Photoperiod initiation of estrus and ovulation in seasonally anestrus mares, *Proc. VIII International Congress on Animal Reproduction and Artificial Insemination*, Cracow, Poland, Vol. I: 190.

Oxender, W.D., P.A. Noden, and H.D. Hafs (1977). Estrous, ovulation and serum hormone concentration in seasonally anestrus mares exposed to 16 hours of light each day for 120 days, *J. Am. Vet. Med. Assoc.*, 170: 149.

Noden, P.A., W.D. Oxender, and H.D. Hafs (1977). Acute changes in progesterone, estradiol and LH after PGF_{2α} in mares, *Am. Soc. Anim. Sci. Absts.*, July: 192.

Noden, P.A., and J.F. Roux (1980). Glucose, cholesterol, triglycerides in the cord blood of infants from high risk pregnancies, *Society for Gynecological Investigation*, Denver, CO, March: 117.

Noden, P.A., and J.F. Roux (1981). Prostaglandin-forming cyclooxygenase in rabbit amnion, yolk sac splanchnopleure, placenta, decidua and uterus at 20 to 30 days gestation, *Society for Gynecological Investigation*, St. Louis, MO, March: 89.

Reynolds, R.P., P.F. Noden, and M.E. Greene (1983). Cortisol-induced abortion in rabbits: maternal serum progesterone and cyclooxygenase activity in the gestational tissues, *Biol. Reprod.*, 28: Suppl. 1: 112.

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Stroud, C., J.M. Whitsett, and P.F. Noden (1984). 2-bromo- α -ergocryptine (CB154) decreased serum prolactin and testosterone, flank gland diameter, total accessory sex gland and testicular weight in prepubertal male golden hamsters, *Physiologist*, 27: 228.

Noden, P., M. Grizzle, M. Greene, and J. Whitsett (1984). Short photoperiod depressed serum testosterone, testes and accessory organ weight during sexual maturation in prairie deer mice, *Physiologist*, 27: 228.

van Leeuwen, W., P.A. Noden, and S.J. Dieleman (1984). Induced abortion with two prostaglandin F_{2α} analogues in mares; plasma progesterone changes, *Amer. Assoc. Equine Prac. Newsletter*, 3: 159 (Abstract 339).

Noden, P., and M. Lancaster (1985). Response of testis to HCG in juvenile deer mice: effect of photoperiod, temperature, and melatonin, *Biol. Reprod.*, 32 (Suppl. 1): 178.

Fail, P.A. (1987). Response of testis to HCG in young deer mice: effect of photoperiod, temperature, and melatonin, *National Research Council Symposium on Role of Biomarkers in Reproductive and Developmental Toxicology*, January 12-13, Washington, DC.

Fail, P.A. (1987). Influence of 35°C and melatonin (MEL) on testosterone (T), testis, and accessory sex organs (ASO) after HCG in juvenile deer mice, *J. Andrology*, 8: P23 (Abstract 26).

Izard, M.K., and P.A. Fail (1987). Progesterone levels during pregnancy in *Galago crassecaudatus*, *Am. J. Primatol.*, 12: 350-351.

Fail, P.A., J.D. George, J.C. Seely, T.B. Grizzle, and J.J. Heindel (1989). Reproductive toxicity of boric acid (BORA) in male mice, *J. Andrology*, 10: P-45.

Fail, P.A., J.D. George, T.B. Grizzle, and J.J. Heindel (1989). Reproductive toxicity of boric acid (BORA) in mice as evaluated by the continuous breeding protocol, *The Toxicologist*, 9 (1): 266 (Abstract 1066).

Grizzle, T.B., H.R. Sauls, S.W. Dennis, and P.A. Fail (1989). Response of testis to HCG in Swiss mice (CD-1) following chronic exposure to boric acid (BORA), *Biol. Reprod.* 40 (1): 153 (Abstract 316).

Izard, M., J. Perry, and P. Fail (1989). Reproductive Biology of Captive *Lemur mongoz.*, *Am. J. Primatol.*, 18:149.

Reynolds, R.P., and P.A. Fail (1990). Nickel chloride (Ni⁺⁺)-induced perinatal toxicity in CD-1 mice may be due to decreased prolactin secretion, *The Toxicologist* 10(1): 224 (Abstract 894).

Izard, M.K., P.A. Fail, and R. Ange (1990). Correlates of puberty in the greater galago, *Am. J. Primatol.*, 20: 201.

Fail, P.A., H.R. Sauls, and S.W. Dennis (1991). Reproductive toxicity of boric acid (BORA) in male deer mice, *J. Andrology*, 12, Suppl. P62 (Abstract 151).

Fail, P.A., and C.S. Stroud (1991). Testicular development in golden hamsters (*Mesocricetus auratus*) is influenced by prolactin, In: *The Male Germ Cell: Spermatogonium to Fertilization*, McGill University, (Abstract 65), p. 90.

Izard, K., S. Anderson, H. Sauls, and P. Fail (1991). The use of chronic cannulation in longitudinal endocrinological studies: factors influencing longevity of patency, *Triangle Consortium for Reproductive Biology Conference: Frontiers of Biotechnology: Molecular Approaches to Reproductive Biology*, Research Triangle Park, NC, January.

Fail, P.A., J.D. George, T.B. Grizzle, J.C. Seely, and J.J. Heindel (1991). Reproductive toxicity of 4-Vinylcyclohexene (VCH) in mice as evaluated by the continuous breeding protocol, *The Toxicologist*, 11 (1): 113 (Abstract 368).

Fail, P.A., S.A. Anderson, M.C. Wani, D. Lee, and C.E. Cook (1991). Response of mouse testis to Sandoz 20-438 (S20438), *Biol. Reprod.*, 42 (1): 175 (Abstract 490).

Bishop, J.B., R.E. Chapin, P.A. Fail, J.D. George, T.B. Grizzle, B.M. Sadler, and J.J. Heindel (1991). Acrylamide-induced dominant lethality in mice following low dose chronic administration in drinking water, *Environ. Molecular Mutagen.*, 17 (19): 11.

Izard, M.K., P.A. Fail, and R. Ange (1992). Cytological and hormonal responses to follicle stimulating hormone (FSH) and human chorionic gonadotropin (HCG) in the greater galago (*Galago crassicaudatus*), *Am. J. Primatol.*, 27: 34.

Fail, P.A., H.R. Sauls, S.W. Pearce, S.A. Anderson, and M.K. Izard (1992). Measures of pituitary and testicular function evaluated with an endocrine challenge test (ECT) in cannulated male rats, *The Toxicologist*, 12 (1): 436 (Abstract 1725).

Izard, M.K., P.A. Fail, J.D. George, T.B. Grizzle, and J.J. Heindel (1992). Reproductive toxicity of cresol isomers administered in feed to mouse breeding pairs, *The Toxicologist*, 12 (1): 198 (Abstract 725).

George, J.D., P.A. Fail, T.B. Grizzle, and J.J. Heindel (1992). Reproductive toxicity of nitrofurazone (NTFZ) administered in the feed to mouse breeding pairs, *The Toxicologist*, 12 (1): 199.

Grizzle, T.B., J.D. George, P.A. Fail, and J.J. Heindel (1992). Reproductive toxicity of carisoprodol (CARI) as evaluated by the continuous breeding protocol, *The Toxicologist*, 12 (1): 197 (Abstract 723).

Anderson, S.A., H.R. Sauls, S.W. Pearce, M.K. Izard, and P.A. Fail (1992). Measures of pituitary and testicular function evaluated with an endocrine challenge test in cannulated male rats, presented at Triangle Conference on Reproductive Biology, Sheraton Imperial Center, RTP, NC, January 11.

Grizzle, T.B., P.A. Fail, J.D. George, R.D. Austin, R.E. Chapin, and J.J. Heindel (1992). Reproductive effects of feed restriction in Swiss (CD-1) mice, presented at Triangle Conference on Reproductive Biology, Sheraton Imperial Center, RTP, NC, January 11.

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Grizzle, T.B., J.D. George, P.A. Fail, and J.J. Heindel (1992). Reproductive toxicity of carisoprodol in Swiss mice, presented at Annual Meeting of North Carolina Society of Toxicology.

Fail, P.A., T.B. Grizzle, J.D. George, R.D. Austin, R.E. Chapin, and J.J. Heindel (1992). Effect of restricted body weight gain on reproduction in Swiss mice, presented at the 1992 Annual Meeting of North Carolina Society of Toxicology.

Anderson, S.A., H.R. Sauls, S.W. Pearce, M.K. Izard, and P.A. Fail (1992). Measures of pituitary and testicular function evaluated with an endocrine challenge test in cannulated male rats, presented at Annual Meeting of North Carolina Society of Toxicology.

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Fail, P.A., J.D. George, T.B. Grizzle, and J.J. Heindel (1993). Potential reproductive toxicity of formamide (FORM) as evaluated by the continuous breeding protocol, *The Toxicologist*, 13: 76.

George, J.D., P.A. Fail, T.B. Grizzle, R.S. Yang, and J.J. Heindel (1993). Reproductive toxicity evaluation of a pesticide/fertilizer mixture administered in the drinking water to Mice, *The Toxicologist*, 13: 77.

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Anderson, S.A., H.R. Sauls, S.W. Pearce, and P.A. Fail (1993). Endocrine responses after boric acid exposure for 2, 9, or 14 days in cannulated male CD rats, Triangle Conference on Reproductive Biology, January.

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Fail, P.A., S.A. Anderson, S.W. Pearce, H.R. Sauls, and R.P. Reynolds (1994). Endocrine toxicity of nickel: effects on prolactin, thyroxine, and progesterone in rodents after subchronic exposure to nickel chloride in drinking water. Presented at Triangle Conference on Reproductive Biology, January 1994.

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