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SELECTED ABSTRACTS ON ANIMAL MODELS FOR
BIOMEDICAL RESEARCH - II

Charles B. Frank, et al

National Academy of Sciences-National Research
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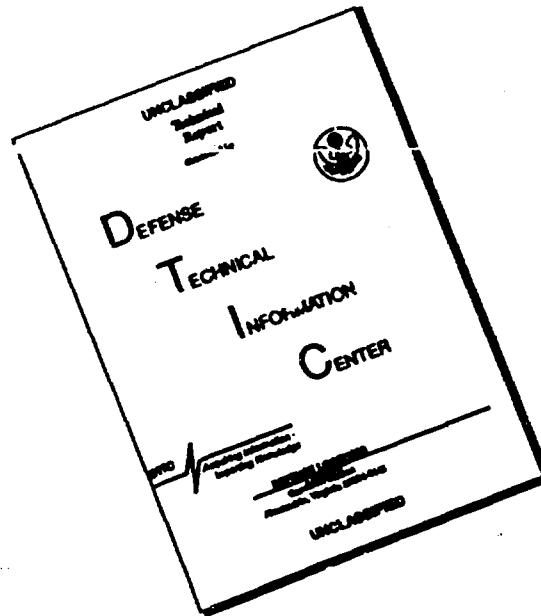
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SELECTED ABSTRACTS

ON

ANIMAL MODELS FOR

BIOMEDICAL RESEARCH - II

Institute of Laboratory Animal Resources
National Research Council
National Academy of Sciences

Washington, D.C. 1972

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INSTITUTE OF LABORATORY ANIMAL RESOURCES

The Institute of Laboratory Animal Resources (ILAR) was founded in 1952 within the Division of Biology and Agriculture. It serves as a coordinating agency to disseminate information, survey existing and required resources, establish standards, promote education, hold conferences, and generally to upgrade laboratory animal resources.

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PREFACE

This publication is the second in a series containing abstracts selected from the biomedical literature pertaining to animal models. These abstracts were accumulated during 1972 and represent only a select portion of papers appearing in journals during the period 1970 - 1972. An earlier edition, published in 1971, contained abstracts of papers appearing in the literature from 1969 - 1970.

There are many papers in the scientific literature pertaining to potential animal models in various fields, and this publication does not purport to be all inclusive. A more comprehensive listing of recent citations appears in the quarterly newsletter, ILAR News, available from the Institute of Laboratory Animal Resources.

In addition to the abstracts presented in this compendium, a special section has been appended that includes a brief review of several recent books or symposium reports specifically related to animal models for research. The appendix (pages 45-56) includes a summary and lists the pertinent papers in these publications.

Since July 1969, the Institute has maintained the Animal Models and Genetic Stocks Program, an information exchange program developed to assist scientists in the selection and location of animal models and genetic stocks for biomedical research. The program accumulates references and major characteristics describing animal models or genetic stocks, the names and addresses of scientific consultants, and a genetic stock registry listing sources of supply and the location of unique animal colonies and mutant stocks throughout the United States. The data are made available without charge to interested individuals in response to specific inquiries and through periodic publication in the ILAR News.

Information is continuously accumulated on colonies of animals that can serve as models for biomedical research. ILAR is asking investigators to assist in the development of its data bank by providing information on animal models or genetic stocks maintained within their institutions. A sample colony data form appears on page 57. Your cooperation in completing this form and providing the information to ILAR will aid in the further development of the Animal Models and Genetic Stocks Information Exchange Program.

The support of investigators is essential if a comprehensive listing of the animal models and genetic stocks being used throughout the country is to be maintained. Interested persons are urged to make suggestions for improving the program and to furnish whatever information they may have concerning potential models or genetic stocks. Readers are requested to complete and return the questionnaire on page 59 to assist ILAR in evaluation of this publication. Correspondence should be addressed to:

Animal Models and Genetic Stocks Program
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ALIMENTARY SYSTEM

1. Chey, W. Y. (The Genesee Hospital and University of Rochester, 224 Alexander Street, Rochester, New York 14607), S. Kosay, H. Siple, and S. H. Lorber. 1971. Observations on hepatic histology and function in alcoholic dogs. Am. J. Dig. Dis. 16:835-838.

Six dogs were administered excessive quantities of ethanol daily through an esophageal tube, for periods ranging from 10 to 18 months. Ethanol levels of venous blood after alcohol was administered ranged from 315 to 477 mg%. Animals were fed a balanced diet. Serial biopsy specimens of the liver revealed fatty metamorphosis in 4 of 6 dogs, as well as degenerative changes of the hepatocytes, including eosinophilic hyaline bodies, cellular necrosis, infiltration with polymorphonuclear leukocytes and centrolobular fibrosis. These histologic alterations of the liver are comparable to those observed in patients with alcoholic hepatitis or alcoholic liver disease other than cirrhosis. In 3 control dogs, there were no changes in hepatic function or in the histologic appearance of the liver. Liver function abnormalities which developed included elevations of serum alkaline phosphatase, serum glutamic pyruvic transaminase and glutamic oxalacetic transaminase, and decreased serum albumin levels. The present investigation indicates that daily administration of excessive amounts of ethanol over a prolonged period can produce hepatic lesions similar to those observed in human alcoholic liver disease. - Authors' abstract.

2. Deinhardt, F. (Departments of Microbiology and Medicine, Rush-Presbyterian-St. Luke's and University of Illinois Medical Centers, Chicago, Illinois), A. W. Holmes, L. Wolfe, and U. Jung. 1970. Transmission of viral hepatitis to nonhuman primates. Vox Sang. 19:261-269.

Evidence is presented that viral hepatitis in marmosets is caused by an actual transmission of human agents and is not an activation of latent marmoset viruses. The investigators summarize the attempts of various laboratories to induce hepatitis in marmosets and to pass the disease serially from animal to animal. In this study, inoculation of marmosets with coded human specimens was carried out using sera or plasmas from normal individuals; from volunteers before inoculation with Willow Brook MS-1 virus and acute phase specimens from the same volunteers. None of the normal human sera or plasmas induced disease in any of the experimental animals, whereas the acute phase specimens induced hepatitis in 21 of 27 white lipped and in 6 of 9 cotton topped marmosets. The authors conclude that there is little doubt left that human infectious hepatitis can be transmitted to marmoset monkeys and can be passed serially from animal to animal. The physical, chemical and antigenic characteristics of the transmissible agent(s) have been partially identified and final identification should be possible with this consistently reliable animal assay system. - M.J.A.

3. Friedland, G. W. (Stanford University School of Medicine, Stanford, California 94305), S. Kohatsu, and K. Lewin. 1971. Comparative anatomy of feline and canine gastric sling fibers. Analogy to human anatomy. Am. J. Dig. Dis. 16:495-507.

Investigation of the function of human sling fibers is not feasible with the use of technics currently available for animal experiments. Thus, this study examined the anatomy of the gastric sling fibers in 22 dogs and 16 cats to determine if either or both resemble that of the human. In both species, the gastric sling fibers hooked around the notch between the gastric fundus and distal esophagus, and traversed the stomach, anterior and posteriorly, parallel to the lesser curve, finally disappearing near the incisura angularis. A constrictor cardiac muscle was found at the upper limit of the sling fibers in both species. The muscularis propria of the distal esophagus of the dog was found to be striated. In contrast, smooth muscle was present in the distal esophagus of the cat. Furthermore, a vestibule, analogous to that described in man, was found in the cat but not in the dog. It has been postulated that the sling fibers play a role in the sphincteric mechanism of the distal esophagus. The finding that the anatomy of the sling fibers and the distal esophagus in the cat resembles that of man suggests that it would be a more suitable model than that of the dog. - *Authors' abstract.*

4. Goldberg, H. I. (Stanford University School of Medicine, Stanford, California), W. J. Dodds, C. Montgomery, S. A. Baskin, and F. F. Zboralske. 1970. Controlled production of acute esophagitis. Experimental animal model. Invest. Radiol. 5:254-256.

Cat esophagi were infused with a standard acid-pepsin solution for 1/2, 1, 2, 4, or 7 hours. The esophagitis scores for each infusion time were closely clustered and the depth of esophageal injury was directly related to infusion time. A model of experimental injury was directly related to infusion time. A model of experimental esophagitis was developed which permits: prediction of esophagitis scores for a given infusion time; esophagitis production of desired depth by selection of the appropriate infusion time. - *Authors' abstract.*

5. Jordan, H. V. (Forsyth Dental Center, Boston, Massachusetts 02115). Rodent model systems in periodontal disease research. J. Dent. Res. 50:236-242.

This paper presents some of the problems of using rodents as experimental models for research in periodontal disease. The scope of the paper has been confined to experimental systems of rats and hamsters. A selective citation has been made of relevant studies within the field, rather than attempting complete coverage of the extensive literature available on the use of rodents in periodontal disease research. An attempt was made to focus on certain aspects of the problem deemed pertinent to continued development of the model for future needs. It was felt that this approach could be aided by a more careful consideration of animal models in general. Inherent weaknesses and limitations of the model have been pointed out. These should be balanced against certain special advantages of the model to make it a useful research tool for future studies. - *Author's conclusions modified.*

6. Kirkpatrick, J. R. (Department of Surgery, Wayne State University School of Medicine, 540 East Canfield Avenue, Detroit, Michigan 48201). 1971. Liver trauma: An experimental model. J. Surg. Res. 11:608-611.

The methods and criteria for creating a standard liver injury in the experimental animal were presented. A variety of animals were studied to find a species with liver anatomy closely paralleling the human. Sheep were found to be ideal subjects for this type of study. Their liver has two main lobes and their biliary, arterial, venous, and portal circulations differ only slightly from those of man. In this study, it was found that a bursting injury produces the most consistent and lethal results. Immediate and profound hypotension out of proportion to blood loss is often seen after this type of injury. It is hoped that this experimental model will be of benefit in comparing present methods of therapy in the treatment of severe liver injuries. - *Author's summary modified.*

7. Lisboa, P. E. (Clinica Universitaria de Patologia Medica, University Hospital of Santa Maria, Lisbon, Portugal). 1971. Experimental hepatic cirrhosis in dogs caused by chronic massive iron overload. Gut 12:363-368.

In this study 19 dogs were subjected to massive parenteral iron loading using intravenous iron-dextran and intramuscular iron-sorbitol. Although 13 animals died, in many cases the deaths were attributable to fighting. The large doses of iron employed (up to 5.8 g/kg) were well tolerated by the surviving animals, and after 35 to 47 months five of the six survivors had developed hepatic cirrhosis with massive siderosis; the dog which had not yet developed cirrhosis received the smallest iron load. The liver pathology in many ways resembled that of human haemochromatosis, and may provide an experimental model for the study of chronic iron-induced liver injury. - *Author's summary modified.*

8. McSherry, C. K. (Department of Surgery and of Medicine, Cornell University Medical College, New York Hospital, New York, New York 10021), F. Glenn, and N. B. Javitt. 1971. Composition of basal and stimulated hepatic bile in baboons, and the formation of cholesterol gallstones. Proc. Nat. Acad. Sci. 68:1564-1568.

The baboon, Papio, has been found to be a model for the study of the pathogenesis of cholesterol cholelithiasis in man. Studies of the physiologic variations in hepatic bile composition indicate a cyclic pattern to the proportions of cholesterol, lecithin, and bile salt in hepatic bile. During reabsorption of the bile salt pool from the intestines (stimulated flow), hepatic bile is characteristically undersaturated with cholesterol. After reabsorption of the bile salt pool (basal flow), hepatic bile is characteristically supersaturated with cholesterol. This typical pattern of basal and stimulated hepatic bile occurs irrespective of the presence of cholesterol stones in the baboon. Recognition of these two types of hepatic bile and their interrelationship during admixture in the gallbladder provides new insight into the pathogenesis of gallstone formation. - *Authors' abstract.*

9. Mohr, J. R. (Medizinische Hochschule Hannover, Roderbruchstrasse, D-3 Hannover, Germany), H. Mattenheimer, A. W. Holmes, F. Deinhardt and F. W. Schmidt. 1971. Enzymology of experimental liver disease in marmoset monkeys. II. Experimental hepatitis. Enzyme 12:161-179.

Marmosets have been shown to develop hepatitis after inoculation of serum from patients with viral hepatitis. The activity alterations of lactate dehydrogenase, isocitrate dehydrogenase, alanine aminotransferase, aspartate aminotransferase, glutamate dehydrogenase, glucose-6-phosphate dehydrogenase, and phosphogluconate dehydrogenase in serum and liver tissue of marmosets with hepatitis suggest that these animals suffer from a mild but relatively protracted hepatocellular injury. Although the enzyme patterns are not identical to those seen in human viral hepatitis, they appear to resemble more closely the picture seen in that disease than in any other. - *Authors' abstract.*

10. Monier, D. (Department of Pharmacology, Indiana University School of Medicine, Indianapolis, Indiana), and S. R. Wagle. 1971. Studies on gluconeogenesis in galactosamine induced hepatitis. Proc. Soc. Exp. Biol. Med. 136:377-380.

Hepatitis was induced in male albino rats treated with D-GalN·HCl (1.5g/kg) in vitro. Incorporation of alanine-Ul-¹⁴C, pyruvate-2-¹⁴C, and glutamine-3,4-¹⁴C acid into glucose by liver slices from GalN-treated animals was found decreased to 20-25% of the control values. The CO₂ production from these substrates was impaired by 50%. Activity of gluconeogenic enzymes was measured. PEP carboxykinase and pyruvate carboxylase exhibited the most important changes and FDPase and G-6-Pase were also significantly decreased but failed to respond to fasting. It is suggested that this GalN-induced hepatitis might be a good model to use to reproduce a study of hypoglycemia found sometimes in human viral hepatitis and other liver damage. - *Authors' summary.*

11. Morris, T. Q. (Department of Medicine, Columbia University College of Physicians and Surgeons, New York, New York 10032), and D. J. Gocke. 1971. Modified acute canine viral hepatitis-- a model for physiologic study. Proc. Soc. Exp. Biol. Med. 139:32-36.

As a model for the study of hepatic function during a severe viral induced injury to the liver, modified acute infectious canine hepatitis offers several desirable characteristics. In this paper a method for production of a severe and prolonged form of canine hepatitis is presented. The clinical course, which is characterized by fever, lethargy, anorexia, marked elevations of serum enzymes, and impaired BSP removal, is most severe 7 to 10 days after infection. The predictable recovery, ensuing by the end of 3 weeks, permits sequential studies from the normal healthy state through a severe hepatitis to recovery. Study of this disease and definition of the recovery sequence may yield additional information and understanding of the physiologic abnormalities in hepatitis. - *M.J.A.*

12. Okabe, S. (Institute of Gastroenterology, Presbyterian-University of Pennsylvania Medical Center, 51 North 39th Street, Philadelphia, Pennsylvania 19104), and C. J. Pfeiffer. 1971. The acetic acid ulcer model - a procedure for chronic duodenal or gastric ulcer. In: Peptic Ulcer, C. J. Pfeiffer (ed.), Munksgaard, Copenhagen.

Two simple methods for the production of clearly defined, deep gastric and duodenal ulcers in rats and cats were reviewed. 1.) Acetic Acid Injection Model. By injection of acetic acid (1-30%, 0.05 ml per rat or 20%, 0.5 ml per cat) into the submucosal layer of the stomach, penetrating experimental ulcers which are confirmed by the contiguous organs (mainly liver) can be induced. Such ulcers in the rat rapidly diminish in size and depth in the early phase of recovery, but even at 200 days are present, presumably by repeated healing and re-aggravation. Histologically the healing processes closely resemble those of human peptic ulcer disease. In the cat, the gastric ulcers heal within 6 weeks and symptoms of re-ulceration were not observed at 91 days. 2.) Acetic Acid Topical Application Model. Application of 100% acetic acid upon the serosal surface of the rat produced penetrating duodenal ulcers as well as gastric ulcers at a low perforation rate. The duodenal ulcers healed completely within 60-80 days after preparation although the gastric ulcers (fundic and antrum) persisted at 80 days following operation. These experimental ulcer models appear to lend themselves to the screening of therapeutic drugs for peptic ulcers of the stomach or duodenum and to the investigation of the mechanisms of chronic ulcer. - *Authors' summary.*

13. Csuga, T. (Department of Primate Nutrition, Oregon Regional Primate Research Center, Beaverton, Oregon 97005), and O. W. Portman. 1971. Experimental formation of gallstones in the squirrel monkey. Proc. Soc. Exp. Biol. Med. 136:722-726.

In this study of the incidence and severity of cholelithiasis in monkeys fed different diets, it is concluded that the squirrel monkey is a valuable model for the formation of gallstones composed of cholesterol. Squirrel monkeys fed a semipurified diet to induce atherosclerosis showed a high incidence of gallstones, which began to appear 3 months after the start of the atherogenic diet. The incidence in animals maintained on this diet for over 9 months was 83%. The gallstones consisted essentially of pure cholesterol and increased in size, number, and total mass of stones during the period of feeding. The cholesterol:phospholipid ratio in bile was highest in the group and in the individuals with stones. Monkeys fed a natural diet had very low ratios and were free of gallstones. - *Authors' summary modified.*

14. Page R. C. (Department of Pathology, University of Washington, Seattle, Washington 98105), D. M. Simpson, W. F. Almons, and L. R. Schectman. 1971. Periodontal disease: Are plasma cells and lymphocytes an essential component? Proc. Soc. Exp. Biol. Med. 138:947-950.

Chronic periodontitis is the major cause of tooth loss in human adults. The consistent presence of a dense infiltrate of plasma cells and lymphocytes in the affected tissues is the basis of the widely held hypersensitivity concept of pathogenesis of the disease. The marmoset exhibits an advanced

form of the disease, with all of the features of tissue destruction seen in man but in the virtual absence of an infiltrate of plasma cells and lymphocytes.
- Authors' summary.

15. Patton, N. M., B. E. Hooper, O. B. Mock (Division of Science, Northeast Missouri State College, Kirksville, Missouri), and R. E. Doyle. 1971.
Periodontal disease in the least shrew. J. Periodont. 42:597-599.

Periodontal disease resembling that described for man was observed in a mini mouse sized mammal, the least shrew (Cryptotis parva). This condition developed spontaneously under laboratory conditions and appeared to be related to the diet. Several different species of bacteria were isolated. E. coli was found to be pathogenic, but it was suggested that it was an opportunist. The least shrew was suggested as a new model for the study of periodontal disease. - Authors' summary.

16. Powell, D. W. (Department of Physiology, Yale University School of Medicine, New Haven, Connecticut 06510), G. R. Plotkin, R. M. Maenza, L. I. Solberg, D. H. Catlin, and S. B. Formal. 1971.
Experimental diarrhea. Intestinal water and electrolyte transport in rat salmonella enterocolitis. Gastroenterology 60:1053-1064.

A model for studying the pathophysiology of diarrhea has been developed by inducing salmonella enterocolitis in rats. In vivo intestinal net water and electrolyte transport rates were determined in infected rats with and without diarrhea and were compared with control animals. The only significant alteration in net water and electrolyte transport between control animals and infected animals without diarrhea was a diminution of ileal absorption and a reversal of ileal HCO_3 transport from secretion to absorption. In the infected animals with diarrhea, jejunal and large intestinal transport was not significantly different from that in infected animals without diarrhea. However, in all animals with diarrhea there was ileal secretion of H_2O , Na, K, and Cl. Thus ileal secretion appeared to be a major physiological determinant of diarrhea in this disease model. Among the possible mechanisms to explain the net blood to lumen transport, the most likely are either (1) a passive transudation of fluid and electrolyte secondary to increased hydrostatic pressure in the lamina propria or (2) active electrolyte secretion by the mucosa. - Authors' summary.

17. Ryan, G. B. (Department of Pathology, University of Geneva, 40 Boulevard de la Cluse, 1211 Geneva 4, Switzerland), J. Grobety, and G. Majno. 1971.
Postoperative peritoneal adhesions. A study of the mechanisms. Am. J. Path. 56:117-148.

This paper describes an experimental model of peritoneal adhesions in the rat, based on two relatively minor accidents that may occur during abdominal surgery in man: drying of the serosa, and bleeding. Drying alone had little effect; drying plus bleeding consistently produced adhesions to the dried area. Fresh blood alone produced adhesions between the three membranous structures [omentum and pelvic fat bodies (PFBs)]. The formation of persistent adhesions required whole blood. Preformed clots above a critical size induced adhesions even without previous serosal injury; they were usually

captured by the omentum and PFBs. If all three membranous structures were excised, the clots caused visceral adhesions. The protective role of the omentum, its structure, and the mechanism of omental adhesions, are discussed. These findings are relevant to the pathogenesis of postoperative adhesions in man. - *Authors' abstract.*

18. Sarles, H. (Unite de Recherches de Pathologie Digestive, Marseille, France), G. Lebreuil, F. Tassé, C. Figarella, F. Clemente, M. A. Devaux, B. Fagonde, and H. Payan. 1971. A comparison of alcoholic pancreatitis in rat and man. Gut 12:377-388.

Acute ethanol intoxication was studied in 38 Wistar rats, 18 on a balanced diet and 20 on a high fat diet, fed by gavage on 47% ethanol in a dosage of from 3 to 12 g/kg body weight daily for periods ranging from three to 16 days. No macroscopic changes in pancreas or liver were found in any of these animals. Histological changes (venous congestion of the pancreas, the liver, and the kidneys) were found in rats given 4 g or more per kilogram. The only difference between the findings in rats given a balanced diet and those given a high fat diet was the development of fatty livers in the latter group. Chronic ethanol intoxication was studied in 45 Wistar rats, on a balanced diet, which were given 20% ethanol freely for 20 to 30 months. More than half the animals developed pancreatic lesions very similar to those of human chronic pancreatitis. The pathological changes, in foci surrounded by normal pancreatic tissue, were a reduction in acini, duct multiplication (probably by neogenesis), protein concentrations than samples taken from two control animals. Protein precipitates appeared spontaneously in the pancreatic juice of the animals exposed to ethanol, but not in that of the controls. These findings are very similar to those in alcoholic pancreatitis in man, which has thus been reproduced for the first time in experimental animals. Beta-cell adenomata of the islets of Langerhans were observed in four of the rats exposed to ethanol. - *Authors' summary.*

19. Stewart, H. L. (Registry of Experimental Cancers, National Cancer Institute, National Institutes of Health, Bethesda, Maryland 20014). 1971. Experimentally induced gastric adenocarcinomas. Maude Abbott lecture, 1971. Lab. Invest. 25:672-674.

The role of agents, alone or in combination, which produce adenocarcinoma of the stomach in experimental animals is reviewed. These include 3-methylcholanthrene; N,N'-2, 7-fluorenylenebisacetamide; N-2-fluorenylacetamide; irradiation; aflatoxins; elaiomycin; N-methyl-N'-nitro-N-nitrosoguanidine; 7, 12-dimethylbenzanthracene; and N-methyl-N-nitroso-N'acetylurea. Incidence, criteria for diagnosis, and different routes of administration in mice, rats, guinea pigs, and hamsters are discussed. The observations in experimental animals are related to the problem of human cancer. - *Author's abstract.*

20. Watt, J. (Department of Pathology, University, Liverpool, England), and R. Marcus. 1971. Carrageenan-induced ulceration of the large intestine in the guinea pig. Gut 12:164-171.

A 5% aqueous solution of degraded carrageenan derived from the red seaweed Eucheuma spinosum was fed to guinea pigs in their drinking water over a period of 20-45 days. Occult blood in the feces and multiple ulcers in the cecum, colon and rectum occurred in 100% of animals by the 30th day.

The clinical and ethological features bear a close resemblance to human ulcerative colitis. The method provides a simple experimental model for the study of various aspects of the pathology of ulcerative lesions in the large intestine and the effects of therapeutic agents. - *Authors' abstract.*

21. Yeary, R. A. (Department of Veterinary Physiology and Pharmacology, The Ohio State University, Columbus, Ohio 43210), and R. H. Grothaus. 1971. The Gunn rat as an animal model in comparative medicine. Lab. Anim. Sci. 21:362-366.

The Gunn rat (Rattus norvegicus) is a mutant of the Wistar strain in which jaundice appears as a recessive trait. This rat strain served as a useful animal model for comparative research on bilirubin excretion, jaundice, kernicterus, bilirubin nephropathy, and perinatal toxicology. - *Authors' summary.*

CARDIOVASCULAR SYSTEM

22. Armstrong, M. L. (Department of Internal Medicine, University of Iowa, Iowa City 52240), and E. D. Warner. 1971. Morphology and distribution of diet-induced atherosclerosis in rhesus monkeys. Arch. Path. 92:395-401.

The distribution and morphology of diet-induced atherosclerosis were studied in adult rhesus monkeys. Diffuse intimal thickening and atheroma formation were generally greater in the coronary and peripheral arteries than in the aorta. The atheromatous lesions resembled those seen in hyperlipidemic man in the prominence of arteritic change, medial damage, the frequent presence of foam cells, and in the common involvement of the aortic and mitral valves. The advanced changes in the hindlimb vessels suggest the potential usefulness of this primate in investigations of the pathophysiology of atheromatous peripheral arteries. - *Authors' abstract.*

23. Burch, G. E. (Department of Medicine of the Tulane University School of Medicine, New Orleans, Louisiana), and C. Y. Tsui. 1971. Evolution of Coxsackie viral valvular and mural endocarditis in mice. Brit. J. Path. 52:360-364.

The acute and chronic effects of infection with Coxsackie virus B₄ are described for the mural endocardium and valves of 170 mice for selected periods from 1-210 days after a single i.p. inoculation of Coxsackie B₄ virus. Significant microscopic changes were seen in the valves in 50 percent of the infected animals and in the mural endocardium in 48 percent of the animals. The time sequence and histology of the changes are described, beginning with the earliest changes noted on the 2nd day after inoculation. Fibrosis or scarring of the valves and mural endocardium are demonstrated in those animals allowed to survive after the 3-5th weeks of infection. Coxsackie B₄ was recovered from the hearts up to 8 days after inoculation and Coxsackie virus specific antigen was demonstrated up to 7 weeks after inoculation. The findings are discussed with reference to chronic "rheumatic" valvular disease in man. - *Authors' summary.*

24. Einzig, S. (Department of Pediatrics, School of Medicine, University of Minnesota, Minneapolis, Minnesota 55455), E. F. Jankus, and J. H. Moller. 1972. Round heart disease in turkeys: A hemodynamic study. Am. J. Vet. Res. 33:557-561.

Round heart (RH) disease in turkeys was studied by cardiac catheterization and was found to have the following features: low normal cardiac output, low systemic arterial pressure, and increased filling pressures. These observations were similar to those of congestive cardiomyopathies in man. This disease in turkeys could provide an experimental model for the study of human cardiomyopathies. - *Authors' summary.*

25. Lee, K. T. (Department of Pathology, Albany Medical College, Albany New York), J. Jarmolych, D. N. Kim, C. Grant, J. A. Krasney, W. A. Thomas, and A. M. Bruno. 1971. Production of advanced coronary atherosclerosis, myocardial infarction and "sudden death" in swine. Exp. Mol. Path. 15:170-190.

The purpose of this study was to develop a model in swine for advanced coronary atherosclerosis and myocardial infarction. The approach was to combine a number of techniques that were thought to induce the development of atherosclerosis, including high-fat, high-cholesterol diets plus propylthiouracil and X-irradiation to the precordial region. The dose of X-irradiation that was used produced no significant changes by itself, but seemed only to enhance the effect of atherogenic diets. Among 28 swine fed the severe atherogenic diet and X-irradiated twice, 24 developed myocardial infarcts. All had advanced coronary atherosclerosis. Many died "suddenly" in the sense that no clinical signs of illness were observed prior to death. Coronary angiography was done on some swine and direct measurements of coronary blood flow on a few others. Coronary atherosclerosis and myocardial infarction were also produced in a few swine without propylthiouracil using a combination of a high-fat, high-cholesterol diet and X-irradiation. - *Authors' abstract.*

26. Lehner, N. D. M. (The Arteriosclerosis Research Center, Bowman Gray School of Medicine, Wake Forest University, Winston-Salem, North Carolina 27103), T. B. Clarkson, and H. B. Lofland. 1971. The effect of insulin deficiency, hypothyroidism, and hypertension on atherosclerosis in the squirrel monkey. Exp. Mol. Path. 15:230-244.

Squirrel monkeys with induced insulin deficiency, hypothyroidism, and hypertension, as well as controls were fed a diet containing 1 mg of cholesterol per calorie for over 3 years. The hypothyroid and insulin-deficient monkeys had significantly greater concentrations of serum cholesterol and β -lipoprotein than did the controls, while the controls and hypertensive monkeys did not differ in these regards. The insulin-deficient, hypothyroid, and hypertensive groups all had more extensive coronary arterial and aortic atherosclerosis than did the controls. Atherosclerosis was especially severe in the insulin-deficient monkeys. The level of systolic blood pressure, the concentration of serum cholesterol, and the concentration of serum β -lipoprotein were significantly and positively correlated with coronary arterial and aortic atherosclerosis. The rate of disappearance of intravenously administered glucose was inversely related to serum cholesterol concentration

and the indices of atherosclerosis. The squirrel monkey may be a good animal in which to study the mechanisms by which these disorders affect atherosclerosis, since these syndromes appear to affect atherosclerosis in this animal similarly as in man. - *Authors' abstract.*

27. Noren, G. R. (Department of Pediatrics, Hennepin County General Hospital, Minneapolis Minnesota), N. A. Staley, E. F. Jankus, and J. E. Stevenson. 1971. Myocarditis in round heart disease of turkeys. A light and electron microscopic study. Virchows Arch. Abt. A Path. Anat. Bd. 352:285-295.

Round heart disease in the turkey has been studied by light and electron microscopy. Myocarditis, characterized by focal muscle cell degeneration and mononuclear infiltrates, was present in turkeys from 1 day after hatching through 8 weeks of age. Myocardial injury was most severe from age 5 to 12 days. Virus-like particles, 60-90 m μ in diameter, resembling the avian leukosis viruses, were present in the myocardial cells of all turkeys with myocarditis. Dilation and hypertrophy, predominantly of the left ventricle developed after the second week of life. Collagen accumulation beneath the endocardium was evident by electron microscopy in 1- and 2-day-old birds. This progressed to marked endocardial fibroelastosis after 1 month and was often associated with involvement of the mitral valve and its papillary muscles and chordae tendineae. Maturing and adult turkeys demonstrated congestive heart failure with congestion of the lungs and liver, pleural effusions and ascites. Because of the similarity of gross and microscopic findings, round heart disease in turkeys may serve as an experimental model for primary endocardial fibroelastosis in humans. - *Authors' summary.*

28. Solez, K., and G. W. Richter (Department of Pathology, The University of Rochester Medical Center, Rochester, New York 14642). 1972. Microembolic renal disease in rats induced with Sephadex. Am. J. Path. 66:163-188.

Sephadex particles (20-80 μ in size) were injected into the abdominal aorta of 134 male Sprague-Dawley rats near the renal arteries. In 31 rats, the right kidney was then removed. The Sephadex particles lodged in glomerular capillaries, afferent glomerular arterioles and interlobular arteries, creating renal infarcts, some of which were grossly visible. Shortly after injection arterial blood pressure rose significantly in most animals. The hypertension in uninephrectomized rats was not demonstrably different from that in rats with two kidneys. Severity and duration of hypertension (up to 8 months) were positively correlated with the number of Sephadex particles in renal vessels, and there was also a positive correlation between the degree of hypertension and serum urea nitrogen levels, and between degree of hypertension and degree of cardiac hypertrophy. The vascular permeability in actually hypertensive rats was abnormal, as judged from penetration of iron-dextran into vessel walls. This experimental model resembles atheromatous microembolic renovascular disease, which may play a significant role in the pathogenesis of unexplained hypertension in patients with advanced aortic atherosclerosis. - *Author's abstract.*

29. Swan, H. (Surgical Experimental Laboratory, Department of Clinics and Surgery, Colorado State University, Fort Collins, Colorado 80521), and D. M. Meagher. 1970. Total body bypass in miniature pigs. Postperfusion pulmonary hypertension. J. Thorac. Cardiovasc. Surg. 61:956-967.

The purpose of this paper was to document the changes seen in miniature pigs following total cardiopulmonary bypass and to present the results of several studies aimed at elucidating the etiology of this syndrome. It was observed that total cardiopulmonary bypass in miniature pigs for a period of 2 hours or longer was consistently followed by death, in spite of the fact that physiologic parameters throughout the period of bypass were normal. The postperfusion syndrome seen in the pig following bypass was similar to that seen in dog and man, but it developed after a much shorter period of bypass. Pulmonary hypertension was uniformly present. The pulmonary pathology seen in pigs following cardiopulmonary bypass appeared to parallel that observed in dog and man; however, the lesions in the pig developed sooner and were more severe. Low flow rates, acidosis, homologous blood, microemboli, loss of pulmonary compliance, and oxygen toxicity appear to have been eliminated as being prime factors in causing the postperfusion syndrome in the pig. The cause of this syndrome has not been identified, but it is believed to be directly or indirectly related to the exposure of blood to the pump-oxygenator system. A factor released or produced by this exposure is thought to be involved in the production of increased pulmonary vascular resistance, followed by a pattern of pulmonary pathologic changes suggesting a change in capillary permeability. The authors conclude that the miniature pig may well prove to be a useful model for the study of pulmonary hypertension and of the pathophysiologic changes associated with the postperfusion syndrome. - *Authors' summary modified.*

30. Wigley, R. D. (Palmerston North Hospital, Palmerston North, New Zealand), K. G. Couchman, and R. Maule. 1970. Polyarteritis nodosa: The natural history of a spontaneously occurring model in outbred mice. Aust. Ann. Med. 19:319-327.

Spontaneous arteritis resembling the chronic form of the human disease polyarteritis nodosa occurred in up to 60% of outbred PN mice. The lesions were similar in histology and distribution to peri-arteritis nodosa as described by other investigators, the marked round cell infiltration occurring in 80% of mice at 18 months being the main difference from the human disease. Perivascular cuffing of renal vessels invariably preceded the arteritis, the frequency of which did not appear to be influenced by lymphoma, chronic virus pneumonia or amyloidosis. There was a significant association with antinuclear antibodies and a low incidence of red cell antibody, but no evidence of hemolytic anemia. The possibility that this disease is due to a chronic virus infection is discussed. - *Authors' abstract modified.*

EAR

31. Wright, D. N. (Department of Microbiology, Brigham Young University, Provo, Utah 84601), and M. Dineen. 1972. A model for study of infectious otitis externa. Arch. Otolaryng. 95:243-247.

The guinea pig was found to be a useful experimental model for the study of otitis externa. Infection of the external ear canal could be induced by methods which would result in human disease. The clinical appearance of the diseased ear canal was similar to that in man. Prolonged exposure to water resulted in a shift from gram-positive normal bacterial flora to abnormal gram-negative flora and in disease. Data presented suggest that the presence of a normal bacterial flora is of significance in reducing the incidence of otitis externa. Removal of ear canal lipids did not result in disease, although this procedure predisposed the ear to infection following contamination. The data support the concept of a multiplex etiology for otitis externa. - *Authors' abstract.*

ENDOCRINE SYSTEM

32. Bavli, S. (Department of Medicine, New York University School of Medicine, New York, New York 10016), and E. E. Gordon. 1971. Experimental diabetic hyperosmolar syndrome in rats. Diabetes 20:92-98.

The diabetic hyperosmolar syndrome occurs predominately in maturity-onset diabetics and is characterized by extreme hyperglycemia, hyperosmolarity of plasma, and absence of ketoacidosis. A syndrome bearing a marked resemblance to the human disease can be produced in rats. The three prerequisites for the development of the experimental syndrome are: (1) moderate nonketotic diabetes (induced by either streptozotocin or alloxan); (2) treatment with hydrocortisone acetate; and (3) water deprivation. Plasma glucose concentrations in cortisol-treated, water-deprived diabetic rats ranged from 838 to 1,488 mg/100 ml and were significantly higher than those of control diabetic or ketoacidotic animals. Neither cortisol treatment alone nor water deprivation alone was adequate to raise plasma glucose concentration above that of control diabetic rats. The blood pH, acetoacetate, and B-hydroxybutyrate of cortisol-treated, water-deprived diabetic rats did not differ significantly from the diabetic control values, but all three of these parameters were different from those of ketoacidotic rats. Neither cortisol treatment, nor water deprivation, nor a combination of the two treatments significantly affected these parameters in nondiabetic rats. By analogy with the experimental syndrome, it is suggested that administration of corticosteroids may play a role in the development of the human hyperosmolar syndrome in some patients. Furthermore, the fact that water deprivation was necessary for the production of the experimental syndrome suggests that the extreme dehydration seen in the human hyperosmolar syndrome is not merely a consequence of hyperglycemia, but also a factor in the development of the extreme hyperglycemia. - *Authors' summary.*

33. Coulson, R. A. (Department of Biochemistry, Louisiana State University Medical Center, New Orleans, Louisiana 70112), and T. Hernandez. 1971. Reptiles as research models for comparative biochemistry and endocrinology. J. Am. Vet. Med. Assn. 159:1672-1677.

Although few species of reptiles have been used as experimental animals in biochemistry or physiology, several are known to be superior in some respects to the traditional laboratory mammals. Their metabolic reactions

are slow and prolonged, and often the response to various stimuli is exaggerated. Low metabolic rates permit careful observations of metabolic reactions for days, and pathways that could not be observed in intact mammals are clearly revealed in several reptiles. - *Authors' summary.*

34. DiGiacomo, R. F. (Laboratory of Slow, Latent and Temperate Virus Infections, National Institute of Neurological Diseases and Stroke, National Institutes of Health, Bethesda, Maryland 20014), R. E. Morris, and L. R. Baez. 1971. Diabetes mellitus in a rhesus monkey (Macaca mulatta): A case report and literature review. Lab. Anim. Sci. 21:572-574.

A naturally occurring case of diabetes mellitus in a rhesus monkey was described. The diabetes, characterized initially by cachexia and polydipsia, responded to insulin therapy but was poorly managed due to lack of proper dietary control. The literature on simian diabetes mellitus, which suggests that this species may be useful as an experimental model, was reviewed. - *Authors' summary.*

35. Howard C. F. (Oregon Regional Primate Research Center, 505 N.W. 185 Avenue, Beaverton Oregon 97005). 1971. New technique for inducing diabetes mellitus in monkeys. Primate News 9(3):3-8.

The feasibility of making monkeys diabetic by the infusion of low concentrations of the drug streptozotocin directly to the pancreas has been demonstrated. Pig-tailed macaques have been used most extensively in developing the diabetic model. The diabetes, similar to all human juvenile and some maturity-onset types, is apparently free of side effects that are introduced when this drug, or other chemicals, is given in higher concentrations into the general systemic circulation. This allows the diabetic-like state to be studied in experimental animals free of side effects unrelated to diabetes. Such a model can be used for studying not only the long-range effects of the numerous alterations in metabolism associated with diabetes but also the diabetes-related development of arteriosclerosis, microangiopathies, and other symptoms of this disease. - *Author's summary modified.*

36. Levy, B. M. (University of Texas, Dental Science Institute, Houston, Texas), S. Hampton, S. Dreizen, and J. K. Hampton, Jr. 1972. Thyroiditis in the marmoset (Callithrix spp. and Saguinus spp.). J. Comp. Path. 82:99-103.

Naturally occurring, histologically evidenced chronic thyroiditis has been found in 40 of 494 (8.1 per cent) marmosets examined. Susceptibility to chronic thyroiditis in this primate appears to be generically related. Chronic thyroiditis was noted in 33 of 209 (11.0 per cent) members of the genus Callithrix and in 7 of 285 (2.5 per cent) animals of the genus Saguinus. Approximately 60 per cent of the colony-born females, 28 per cent of the colony-born males, 12 per cent of the wild-caught females and 9 per cent of the wild-caught males of the genus Callithrix had chronic thyroiditis. In one runted Callithrix argentata the histological changes in the thyroid mimicked those of Hashimoto's disease. The pronounced vulnerability of marmosets of the genus Callithrix to chronic thyroiditis provides a new primate model for the study of the natural history of this disease. - *Authors' abstract.*

37. Mizejewski, G. J. (Veterans Administration Hospital and Department of Internal Medicine, University of Michigan Medical Center, Ann Arbor, Michigan 48105), J. Baron, and G. Poissant. 1971. Immunologic investigations of naturally occurring canine thyroiditis. J. Immunol. 107:1152-1160.

Naturally occurring canine thyroiditis was characterized in the present study by immunodiffusion, passive hemagglutination, complement fixation, immunofluorescence and skin tests. Canine thyroglobulin and thyroid gland extract were used as sources of antigen in all tests. Thyroid histology was examined in all instances. The study mainly concerned 11 beagles, which were classified as thyroiditis colony dogs. Precipitation antibodies were not detectable, while low titers of PHA and varying titers of CF antibodies were present in the sera of the thyroiditis colony dogs. Among the serologic procedures employed, only the fluorescent antibody (FA) tests were consistently positive. The skin test was generally positive in the less progressive stages of the disease. The dog thyroid extract rather than purified thyroglobulin was required for PHA antibody detection. This latter observation, together with the FA staining patterns obtained, implied involvement of the second colloid antigen. Overall evidence from present and past studies suggested that the development of the canine disorder is similar in many respects to human thyroiditis. - *Authors' abstract.*

38. Strasberg, S. M. (Department of Surgery, University Hospital, Boston University, School of Medicine, Boston, Massachusetts), N. G. Sixt, and R. H. Egdahl. 1970. A primate model for the experimental production of Cushing's disease. Surg. Forum 21:87-88.

It has been shown in rhesus monkeys that amygdalar stimulation leads to increased 17-hydroxycorticosteroids (17-OHCS) concentrations and this finding has been confirmed in a variety of animals, including man. In earlier reports the response was only temporary, lasting less than two hours, either due to the experimental design or because the response faded despite continuing stimulation. In this study the amygdala of rhesus monkeys was selected as the site for stimulation and by using bilateral stimulation and different parameters, the investigators succeeded in achieving prolonged stimulation during the entire experimental period. Thus, amygdalar stimulation resulted in elevation of plasma 17-OHCS concentrations for prolonged stimulus periods. This preparation may provide a suitable animal model for the study of Cushing's disease. - *M.J.A.*

EYE

39. Huang, L. H. (Wills Eye Hospital Research Institute, 1601 Spring Garden Street, Philadelphia, Pennsylvania 19130), and T. W. Sery. 1971. Corneal degeneration in a congenitally diabetic inbred strain of mouse. Brit. J. Ophthal. 55:266-271.

A corneal degeneration has been described in an inbred mouse line, the KK congenitally diabetic strain. The lesion begins in early life, is progressive with age, tends to be bilateral, and is confined mainly to the anterior part of the corneal centre. The lesions appear to be due to an inherited

degeneration, but it is not known if they are the result of diabetes or of a separate genetic aberration. The condition is not due to exposure trauma such as that found in mutant mice which are born with slit lids or open eyelids. Histological study has revealed the presence of abundant calcium in the corneal lesions. Recent findings of tissue calcium deposition in the KK mouse heart and kidney after deficient dietary magnesium suggest that the corneal damage demonstrated in this study may also be related to dietary magnesium deficiency and raised dietary phosphorus in diabetic KK mice. The availability of an animal model with one form of corneal degeneration will provide ready access to viable tissues for biochemical and histopathological studies. - *Authors' summary.*

40. Komich, R. J. (3741 High Point Road, Greensboro, North Carolina 27407). 1971. Anophthalmos: An inherited trait in a new stock of guinea pigs. Am. J. Vet. Res. 32:2099-2105.

Anophthalmos is prevalent as an inherited trait in an actively reproducing stock of guinea pigs. Forty-three matings of bilaterally anophthalmic boars and sows produced 113 offspring, 93 (82.3%) of which were bilaterally anophthalmic. Nervous tissue changes included absence of the optic nerves and optic tracts, as well as hypoplasia of related oculovisual structures (lateral geniculate bodies and superior colliculi) within the brain. The optic canals and orbits of the bony skull were small. Anophthalmic guinea pigs demonstrated normal breeding behavior and reproduced satisfactorily. Birth weights and growth curves were comparable to normal values, and longevity was unaffected. It is anticipated that this stock of guinea pigs will provide the scientific community with a new laboratory animal model. - *Author's summary.*

HEMATOPOIETIC SYSTEM

41. Cooper, A. G. (Department of Pathology, Tufts Medical School, 136 Harrison Avenue, Boston, Massachusetts 02111), and D. L. Brown. 1971. Haemolytic anaemia in the rabbit following the injection of human anti-I cold agglutinins. Clin. Exp. Immunol. 9:99-110.

Anti-I cold agglutinins, purified from the serum of patients with chronic cold haemagglutinin disease, were injected intravenously into adult rabbits, which are known to have I antigen on their red cells. This caused acute intravascular haemolysis, with haemoglobinaemia, haemoglobinuria and anaemia. In addition, there was an acute, but usually transient, thrombocytopenia and neutropenia. Anti-coagulation with heparin or Arvin had no influence on the effect of cold agglutinin injection, but massive doses of heparin, thought to interfere with complement binding by the cold agglutinin, did prevent the haemolysis, thrombocytopenia and neutropenia. A rabbit, given daily injections of cold agglutinin, developed significant intravascular haemolysis only with the first injection. However, a chronic extravascular haemolytic anaemia occurred with marked spherocytosis, reticulocytosis and shortening of the red cell survival. The effects of injection of human anti-I cold agglutinins into rabbits are analogous to certain aspects of the human disease and this rabbit model may be useful in further studies of in vivo complement binding and removal of complement coated cells. - *Authors' summary.*

42. Fox, R. R. (The Jackson Laboratory, Bar Harbor, Maine 04609), H. Meier, D. D. Crary, R. F. Norberg, and D. D. Myers. 1971. Hemolytic anemia associated with thymoma in the rabbit. Genetic studies and pathological findings. *Oncology* 25:372-382.

The presence of an hereditary hemolytic anemia in the X strain of rabbits is reported. This condition is rapidly fatal to both sexes with a mean survival time of 4.75 months. In rare protracted cases it is associated with thymic hyperplasia and thymoma. Because autosomal recessive inheritance is indicated the symbol ha has been assigned to the gene responsible for development of the hemolytic anemia. The possibility exists that it is identical with the gene (ls) conferring susceptibility to lymphosarcoma in strain WJ rabbits, since all affected animals in both strains have the same common ancestry in strain X. A common gene responsible for all conditions may have phenotypic expressions which are dependent on the host genotype. Breeding experiments are in progress to test this hypothesis. In summary, the authors report the hereditary basis for hemolytic anemia in strain X rabbits and discuss the pathological finding. This represents a new model for study of anemia and is caused by a single autosomal recessive gene. It is believed that the hemolytic anemia in strain X rabbits is similar to that of NZB mice and represents as in man and the dog, an immunopathy: (a) it has a hereditary basis, the autosomal recessive gene, ha conferring susceptibility, (b) it has been associated with an abnormal lymphoid system and thymoma development in a few protracted cases, and (c) preliminary data indicate that the homozygous (ha/ha) rabbits are Coombs positive. - *Authors' abstract modified.*

43. Stowell, R. E. (National Center for Primate Biology, University of California, Davis, California 95616), K. Smith, C. Espana, and V. G. Nelson. 1971. Outbreak of malignant lymphoma in rhesus monkeys. *Lab. Invest.* 25:476-479.

These initial 24 cases of an outbreak of malignant lymphoma occurred during an interval of 25 months at the National Center for Primate Biology. The incidence of lymphoma was disproportionately high in adult female Macaca mulatta with widespread, diverse organ involvement. Inoculation of tumor cells into one immunosuppressed neonate rhesus resulted in widespread tumor growth in 3 months at sites other than those of inoculation. Preliminary studies of pathogenesis indicate the need for further evaluation of several viral isolates, epidemiologic studies of proximity of affected animals, the potential role in some of the animals of repeated exposure to roentgen radiation, and/or prior infection with malarial parasites. A number of the features of this lymphoma resemble Burkitt's tumor in man. - *Authors' abstract modified.*

44. Shifrine, M. (Radiobiology Laboratory, Department of Veterinary Microbiology, University of California, Davis, California 95616), M. S. Bulgin, N. E. Dollarhide, H. G. Wolf, N. J. Taylor, F. D. Wilson, D. L. Dungworth, and Y. Zee. 1971. Transplantation of radiation-induced canine myelomonocytic leukemia. *Nature* 232:405-406.

The investigators developed a canine model which shows promise for

studies of certain aspects of the pathogenesis of myelomonocytic leukaemia (MML) as related to changes that develop in a single animal. This report concerns the transplantation of cells from a dog with MML. Lesions observed in the hematopoietic organs of the recipients closely resembled those in the original donor dog, but were more pronounced. The population of neoplastic cells in the recipients consistently had more primitive cell types than the donor population. A further prominent feature was the occurrence, in all recipients, of large retroperitoneal masses of chloromatous tumour tissue in the sublumbar region, comprising up to 10% of the host's body weight. Cytogenetic evaluation of the recipient puppies, by analysis of the males sex chromosomes, showed conclusively that the tumour tissues consisted of the original female donor cells. Most of the cells examined from all the recipient puppies contained a very small, abnormal, acrocentric autosome which may be a disease-specific marker comparable with the Philadelphia chromosome that is characteristic of chronic granulocytic leukaemia in man. Thus, the authors have demonstrated, by the transplantation of malignant cells, the feasibility of using the dog as a model for the study of myelogenous leukaemia. - M.J.A.

MUSCULOSKELETAL SYSTEM

45. Bentley, G. (Nuffield Orthopaedic Centre, Oxford, England). 1971. Papain-induced degenerative arthritis of the hip in rabbits. J. Bone Joint Surg. 53B:324-337.

Degenerative arthritis has been produced consistently in adult rabbits by the injection of the proteolytic plant enzyme papain into the hip joint. Arthritic changes were recognizable radiographically after six weeks. A progression of changes occurred, from loss of acid mucopolysaccharide staining in the matrix, fibrillation, fissuring and erosion of articular cartilage with death of chondrocytes in the weight-bearing areas, to secondary bony changes of subchondral sclerosis, occasional cysts and osteo formation. Synovial inflammation occurred with accumulation of cartilage and bone debris in the inferior capsule and later capsular thickening. It is suggested that this arthritis is sufficiently similar to human osteoarthritis to be useful as a model for further studies of the pathogenesis of the disease and the effects of different methods of treatment. - *Author's summary.*

46. Hannan, P. C. T. (Chemotherapeutic Research Centre, Beecham Research Laboratories, Brockham Park, Betchworth, Surrey, England), and B. O. Hughes. 1971. Reproducible polyarthritis in rats caused by Mycoplasma arthritidis. Ann. Rheum. Dis. 30:316-321.

Mycoplasma arthritidis strains PG 6(T-R), ATCC 19611, ATCC 13988, and ATCC 14124, were each screened for their arthritogenic virulence in Sprague-Dawley female rats. Only strain ATCC 14124 would cause arthritis. The incidence of infection with unconcentrated cultures of this strain was 100 per cent after intravenous injection. Injection into the foot pad or peritoneum was generally ineffective. The incubation time of the culture was not critical above 24 hours, cultures from 24 to 77 hours all causing arthritis in 100 per cent of the infected rats. Details of the storage, culture, and identification of the mycoplasma strains are given. The animal model is considered to be suitable for the chemotherapeutic evaluation of drugs and the study of mycoplasmal arthritis. - *Authors' summary.*

47. Mansson, I., R. Norberg, B. Olhagen (Department of Rheumatology, Karolinska sjukhuset, 104 01 Stockholm 60, Sweden), and N. E. Bjorklund. 1971. Arthritis in pigs induced by dietary factors. Clin. Exp. Immunol. 9:677-963.

Eight-week-old pigs fed a protein-rich diet ad libitum developed an abnormal intestinal microbial flora within 1 week. The main feature was a significant increase in the number of atypical Clostridium perfringens, type A. In the first week after the change of diet, the pigs showed disturbances of movement and swollen peripheral joints. The ESR was concomitantly elevated and later on hypergammaglobulinaemia with increased antibody titres to Cl. perfringens antigens were noted. Joint deformities were observed after some months. The joint lesions consisted of synovitis with a cell-rich exudate. The lesions of the synovial tissue were characterized by proliferation of the synovial lining cells with villous hypertrophy and highly vascularized granulation tissue containing accumulations of lymphoid cells. Pannus formation and erosion of joint cartilage were seen in some animals. Bacteriological examination, including search for mycoplasmas, was negative. Subcutaneous nodules of rheumatoid nature were also found. Signs of proliferative glomerulonephritis were demonstrated in most of the animals. Different pathogenic aspects are discussed with regard to the direct influence of Cl. perfringens antigens on the joint tissues, circulating antigen-antibody complexes and cell-bound antibodies. As the same abnormal intestinal flora and immunological reaction to intestinal Cl. perfringens have been found in human rheumatoid disease, this diet-induced pig arthritis of remarkably similar clinical and histological characteristics is of special interest. - *Authors' summary.*

48. Morgan, G. (Department of Medicine, UCLA School of Medicine, Los Angeles, California), J. B. Peter, and B. B. Newbould. 1971. Experimental allergic myositis in rats. Arthrit. Rheum. 14:599-609.

Experimental allergic myositis (EAM) closely resembling human polymyositis was produced in rats by a single injection into two inguinal lymph nodes with either homogenates or purified subcellular fractions of homologous muscle in Freund's complete adjuvant. EAM is not necessarily accompanied by clinically evident arthritis and is manifest by elevated serum enzymes, and widespread but focal necrosis and phagocytosis of muscle fibers. EAM was transferred to normal animals of the same strain by infusion of washed lymphocytes from affected animals. - *Authors' abstract.*

49. Najjar, T. A. (Department of Pathology, University of Alabama, Birmingham, Alabama 35233), and D. S. Kahn. 1971. Experimental model for the study of osteogenesis and remodeling. J. Dent. Res. 50:960-965.

An experimental model for bone healing that yielded a consistent pattern at each chronological period was described. This rabbit model was useful in studies of the effect of various systemic and mechanical factors on osteogenesis and remodelling. The osteoblastic blastema arose mainly from the periosteum. Cartilage was not found at any stage of the healing and this rules out the indispensibility of this tissue as a bone inducer. The study

confirms that osteoclasts are not the only source of bone resorption. Incorporation of the callus with the cortex appeared to involve the creation of new osteon formed partly by the callus and partly by the original bone. - *Authors' summary modified.*

50. Seegmiller, R. (Department of Genetics, McGill University, Montreal, P. Q., Canada), F. C. Fraser, and H. Sheldon. 1971. A new chondrodystrophic mutant in mice. J. Cell Biol. 48:580-593.

The occurrence of a recessive mutation that affects the skeletal system in mice provides a model for studying genetic control of growth organization at the tissue, cell, and molecular levels. In this study the occurrence of a new mutation, designated chondroplasia, and affecting cartilage and bone in mice, is reported. The gene is lethal, shows autosomal recessive inheritance, and has high penetrance. It is not allelic to shorthead and probably not to phocomelia or achondroplasia. It results in a foreshortened face, cleft palate, defective trachea, and shortened long bones with flared metaphyses. Chondrocytes of epiphyseal cartilage from the mutant are not aligned in columns, and there is a decrease in the usual straining of the cartilage matrix. Electron microscope observations show large, wide collagen fibrils with "native" banding in the matrix of mutant cartilage, which are not present in normal cartilage. Possible explanations for the expression of this genetic disorder of cartilage development are put forward. The occurrence of this mutation in mice that affects chondrogenesis thus provides a model which adds new insight into the biology of normal cartilage and bone. - *Authors' abstract modified.*

NERVOUS SYSTEM

51. Bourgeois, C. H. (Medical Research Laboratory, SEATO, Medical Project, Bangkok, Thailand), R. C. Shauk, R. A. Grossman, D. O. Johnsen, W. L. Woodling, and P. Chandavimol. 1971. Acute aflatoxin B₁ toxicity in the macaque and its similarities to Reye's syndrome. Lab. Invest. 24:206-216.

Each animal in 6 groups of 4 macaques (Macaca fascicularis) was given either 0 (controls), 0.5, 1.5, 4.5, 13.5, or 40.5 μ g of chromatographically pure aflatoxin B₁ [from Asperigillus flavus]/kg of body weight. Death occurred in 1 animal receiving 4.5 mg/kg and in all animals receiving 13.5 mg/kg or more. Cough, vomiting, diarrhea, and coma were characteristic clinical findings. Significant changes in serum chemistry values included: hypoglycemia, increased nonesterified fatty acids and transaminases, and decreased phospholipids. Cerebral edema with neuronal degeneration, bile duct hyperplasia, hepatic cell necrosis, lymphocytolysis, and marked fatty degeneration of the liver, heart, and kidneys were found at autopsy. There is a striking similarity between this reaction in the macaque and Reye's syndrome or encephalopathy and fatty degeneration of the viscera in children. - *Authors' abstract modified.*

52. Butcher, R. E. (Institute for Developmental Research, University of Cincinnati, Eden Bethesda Avenue, Cincinnati, Ohio 45219), R. M. Stutz, and H. K. Berry. 1971. Behavioral abnormalities in rats with neonatal jaundice. Am. J. Ment. Defic. 75:755-759.

Gunn rats are a Wistar substrain in which an enzymatic defect leading to neonatal jaundice and brain damage is inherited as a recessive trait. In 3 experiments, the behavior of homozygous (jj), brain-damaged animals of the Gunn strain was compared to that of asymptomatic littermate controls (JC). Despite the locomotor impairment (ataxia) present in the jj rats, their open field and activity-cage activity levels equalled or exceeded that of controls. In a swimming maze, the jj rats made more errors than JC subjects in learning to escape from water. Because the hyperactivity and learning impairment observed in the jj Gunn rat results from physiological events which closely parallel those found in humans, it is believed that the systematic examination of the behavior of these animals will contribute significantly to the comparative study of mental retardation. - *Authors' abstract*.

53. Cummings, J. L. (Department of Anatomy, New York State Veterinary College, Cornell University, Ithaca, New York), and D. C. Haas. 1972. Animal model for human disease: Idopathic polyneuritis, Guillain-Barré syndrome. Am. J. Path. 66:189-192.

The clinical features of coonhound paralysis are very similar to those reported in the human Guillain-Barré syndrome. In man, however, the onset is preceded by an infection which often involves the upper respiratory tract. The initial symptom is usually weakness of the lower extremities which extends rapidly to the upper extremities and facial muscles. Pathologic changes in coonhound paralysis also resemble those found in the Guillain-Barre syndrome both in type and location. Changes in roots and nerves include perivenular leukocytic infiltration; degeneration of myelin sheaths, both Wallerian and segmental types; swelling and fragmentation axis cylinders, and chromatolysis of ventral horn cells. - *Authors' comments*.

54. Dukes, T. W. (Veterinary Services Laboratory, ODAF, Kemptville, Ontario), W. K. Read, W. W. Bray and C. A. Gleiser. 1971. A drug-induced cerebrospinal lipodystrophy in the domestic chicken (Gallus domesticus). Canad. J. Comp. Med. 35:208-211.

A drug-induced lipidosis of the central nervous system of chickens is reported. Membranous cytoplasmic neuronal inclusions similar to those seen in Tay-Sach's disease in man and in spontaneous or drug-induced disease in swine were seen by electron microscopy. Fat was demonstrated in frozen sections. - *Authors' summary*.

55. Greenfield, S. (The Saul R. Korey Department of Neurology, Albert Einstein College of Medicine, Bronx, New York 10461), W. T. Norton, and P. Morell. 1971. Quaking mouse: Isolation and characterization of myelin protein. J. Neurochem. 18:2119-2148.

A new technique, involving final purification on a continuous CsCl

gradient, was utilized for the isolation of cerebral myelin from adult (4- to 6-month-old) quaking mice, littermate controls and young (10-day-old) mice was 5-10 per cent of that from adult controls. After delipidation, myelin proteins were separated by polyacrylamide gel electrophoresis in buffers containing sodium dodecylsulphate. Two gel systems were utilized: (1) a high-resolution discontinuous electrophoresis system; and (2) a continuous system utilizing gels cross linked with ethylenediacrylate (EDA). The gels from the discontinuous system were stained with Fast Green and quantified by densitometry. The base lability of the EDA-linked gels permitted direct chemical determination of protein in specific bands. Myelin from brains of normal adult mice contained, as major components, one proteolipid and two basic proteins. There were also a number of high-molecular-weight proteins which represented a significant distribution of proteins but the high-molecular-weight fraction comprised a much greater percentage of the total protein. The ratio of basic to proteolipid protein in preparations from quaking mice was considerably higher than that in the myelin from control mice. The distribution pattern of the myelin proteins from 10-day-old mice was quantitatively similar to that of quaking mice. Altogether the evidence supports the hypothesis that the quaking mutant provides a model of an immature nervous system with respect to myelination. - *Authors' abstract.*

56. Herschkowitz, N. (Department of Pediatrics, University of Bern, Switzerland), F. Vassella, and A. Bischoff. 1971. Myelin differences in the central and peripheral nervous system in the 'Jimpy' mouse. J. Neurochem. 18:1361-1363.

The 'Jimpy' mouse is a sex-linked recessive mutant, characterized clinically by the onset of tremor, tonic seizures, and death. Since myelin in the central nervous system is derived from the cell membranes of the oligodendrocytes and the myelin of the peripheral nervous system is formed by the Schwann cells, the structure and metabolism of the two systems in this mutant mouse have been compared. The results indicate that the mutation in the 'Jimpy' mouse affects the central myelin only and, according to the authors' criteria, the peripheral myelin is not affected. Their results are consistent with the hypothesis that there exist different genetic controls for myelination in the oligodendrocytes and in the Schwann cells. This makes the 'Jimpy' mouse a useful mutant for the investigation of the regulation of myelin metabolism. - *M.J.A.*

57. Lehrich, J. R. (Wistar Institute, Philadelphia, Pennsylvania 19104), M. Katz, L. B. Rorke, G. Barbanti-Brodano, and H. Koprowski. 1970. Subacute sclerosing panencephalitis in hamsters. Trans. Am. Neurol. Assn. 95:51-56.

The viral agents of subacute sclerosing panencephalitis (SSPE), either present in brain biopsies of patients or isolated from their brain tissue maintained in culture, have been found to be pathogenic for ferrets, with encephalitis becoming manifest after a prolonged incubation period. Because of the difficulties involved in handling ferrets, and the excessive cost of their maintenance, a search for another experimental host became necessary - an animal at least as susceptible as the ferret to SSPE infection, but easier

to handle and less costly to maintain. The present study shows that the Syrian hamster meets these criteria. Hamsters inoculated intracerebrally with cultured brain cells derived from biopsies of subacute sclerosing pan-encephalitis (SSPE) patients and with cell-free suspensions of the SSPE viral agents developed clinical signs of encephalitis and died 9 to 18 days after inoculation. Histological lesions of encephalitis were present in animals dying 14 or more days after inoculation. Two ferrets inoculated intracerebrally with brain tissue from one of the sick hamsters developed encephalitis. Infectious viral agents reisolated from brains of sick hamsters resembled the agents in the original inoculum in their infectivity and in their immunological and ultrastructural characteristics. The SSPE agents proved to be much more neurotropic than measles virus. Only one suckling hamster died of the 36 inoculated intracerebrally with measles virus as compared to 25 deaths among the 32 suckling hamsters inoculated with equivalent quantities of the SSPE agents. The encephalitis produced in hamsters by the SSPE infectious agents provides a useful in vivo system for the study of these agents. - *Authors' summary modified.*

58. Martinez, A. J. (Department of Pathology, Division of Neuropathology, Medical College of Virginia, Virginia Commonwealth University, Richmond, Virginia 23219), C. Nelson, M. M. Jones, R. J. Duma, and W. I. Rosenblum. 1971. Experimental Naegleria meningoencephalitis in mice. An electron microscope study. Lab. Invest. 25:465-475.

In mice a primary amebic meningoencephalitis which appears almost identical with the disease seen in humans is produced by intranasal inoculation with strains of Naegleria isolated from fatal human cases. This report deals with electron microscopic studies of the murine model. The infection was induced by nasal instillation of Naegleria strains isolated from human cases who died during the summers of 1967 and 1968. Animals were sacrificed at 5 to 7 days after inoculation, at which time, they were moribund. As in human cases, hemorrhagic meningoencephalitis was found throughout the nervous system, with the olfactory lobes and the base of the frontal lobes most markedly involved. Gray and white matter were both affected. Degenerative changes were characterized by dense collections of axoplasmic organelles, by swelling of axoplasm, and by pouching and bursting of myelin sheaths. Macrophages and leukocytes, including eosinophils, participated in the host response. Trophozoites were located between neurons and glia and adjacent to blood vessels. Ultrastructural characteristics of the amebas resembled those reported in Naegleria isolated from other human cases. Amebas displayed evidence of vigorous motility and feeding. Degenerating erythrocytes, portions of leukocytes, myelin figures, and occasionally, apparently degenerating axons were seen within amebas. The incubation period, path of entry into brain, areas of brain affected, involvement of both gray and white matter, hemorrhagic nature of the meningoencephalitis, and presence of eosinophils in the host response are all features observed in human cases of infection with Naegleria. These similarities suggest that the murine model is excellent for furthering our understanding of the disease. - *Authors' abstract.*

59. Percy, D. H. (Department of Pathology, Yale University School of Medicine, New Haven, Connecticut), and B. S. Jortner. 1971. Feline lipidosis. Light and electron microscopic studies. Arch. Path. 92:136-144.

A spontaneous case of lipidosis occurred in a 5 month old domestic cat. Microscopically, cytoplasmic vacuolation of nerve cell bodies in the central nervous system, retina, and ganglia was seen. Similar vacuolation was observed in cells of the reticuloendothelial system of the liver, spleen, and lymph nodes. The nature of this material was not determined by histochemical staining, but biochemical studies revealed an increase in sphingomyelin in affected tissues. Lamellar, membranous cytoplasmic inclusions were demonstrated in neurons and splenic cells by electron microscopy. In summary, the clinical history, histologic, histochemical, and biochemical findings in this case closely resembled a similar case of lipidosis described in the Siamese cat. The distribution of lesions, together with the morphologic and biochemical studies, indicate that this disease is similar in some respects to Niemann-Pick disease in man. This feline model may be of considerable value in future studies of lipid storage disease in man. - *Authors' abstract modified.*

60. Siegel, B. A. (Mallinckrodt Institute of Radiology, 510 S. Kingshighway Boulevard, St. Louis, Missouri 63110), R. Meidinger, A. J. Elliott, K. Studer, C. Curtis, J. Morgan, and E. J. Potchen. 1972. Experimental cerebral microembolism. Multiple tracer assessment of brain edema. Arch. Neurol. 26:73-77.

Cerebral microembolism with carbon microspheres was studied by simultaneous radioactive tracer determination of the red blood cell, albumin, iodoantipyrine, and pertechnetate spaces in the rat brain. Brain edema was evident beginning at four hours after embolization and was associated with decreased cerebral blood volume. Early edema was not accompanied by abnormal capillary permeability to macromolecules; however, the albumin space was increased at later times. Increases in the whole brain and the more heavily embolized right hemisphere pertechnetate spaces developed prior to similar changes in the albumin space. The iodoantipyrine space did not reliably reflect total brain water possibly due to rapid hepatic deiodination of this molecule. In summary, the authors have applied a method for the simultaneous determination of multiple brain spaces to an experimental model of cerebral microembolism. They have identified a pattern in the alterations of these spaces accompanying acute ischemic cerebral edema. The results suggest that both method and model will be of further value in investigating the pathophysiology of ischemic brain injury. Furthermore, it may be possible to develop a similar method to appraise brain swelling in patients. - *Authors' abstract modified.*

61. Swenberg, J. A. (Department of Veterinary Pathology, The Ohio State University, Columbus, Ohio 43210), A. Loestner, and W. Wechsler. 1972. The induction of tumors of the nervous system with intravenous methyl-nitrosourea. Lab. Invest. 26:74-85.

Repeated intravenous administration of methylnitrosourea (5 mg. per kg. per week for 36 weeks) resulted in the production of neurogenic neoplasms in 97 per cent of the experimental rats. The sex and strain of rat were found to influence animal survival time and tumor incidence. Male Sprague-Dawley rats had the shortest median survival time (265 days) and the highest incidence of grossly detectable brain tumors (100 per cent). Fischer rats of either sex developed more peripheral nerve tumors and fewer brain tumors than did Sprague-Dawley rats. Subcortical white matter and periventricular

regions represented predilection sites for experimental tumor development. A progression from focal oligodendroglial proliferation to grossly visible brain tumors was evident. Smaller neoplasms tended to be well differentiated, while large tumors were often anaplastic. Electron microscopy confirmed the neuroectodermal origin of methylnitrosourea-induced neoplasms and aided the identification of poorly differentiated cells. Using light and electron microscopy, the experimental tumors were classified as astrocytomas, oligodendrogliomas, mixed gliomas, anaplastic gliomas, gliosarcomas, and differentiated and anaplastic neurinomas. Characteristic glial filaments and microtubules were demonstrated in gliomas and gliomatous portions of gliosarcomas. Sarcomatous regions in gliosarcomas occasionally formed collagen. Neoplastic Schwann cells appeared to be the main participant in neurinomas, since a complete or partial basement membrane was associated with most tumor cells. The experimental production of neurogenic neoplasms with methylnitrosourea represents an excellent model for research in neurooncology. A high incidence of autochthonous tumors of the central or peripheral nervous systems can readily be induced following intravenous administration of the resorptive carcinogen, eliminating the complication of surgical trauma. - *Authors' abstract.*

REPRODUCTIVE SYSTEM

62. Gooding, C. A. (San Francisco Medical Center, San Francisco, California 94122), G. A. Gregory, P. Taber, and R. R. Wright. 1971. An experimental model for the study of meconium aspiration of the newborn. Radiology 100:137-140.

Experiments leading to the development of a model to study meconium aspiration of the newborn are described. The final model consisted of the undelivered progeny of a hysterotomized pregnant dog under spinal anesthetic. The puppies were subjected to tracheal intubation and meconium injection before clamping the umbilical cords. This model may be used to provide objective evidence of the value of parenteral steroids administration in instances of meconium aspiration in the newborn. - *Authors' abstract.*

63. Guthrie, J. (Tenovus Research Laboratory and Department of Morbid Anatomy, Southampton General Hospital, Southampton). 1971. Zinc induction of testicular teratomas in Japanese quail (*Coturnix coturnix japonica*) after photoperiodic stimulation of testis. Brit. J. Cancer 25:311-314.

Teratomas have been induced in Japanese quail (*Coturnix coturnix japonica*) by intra-testicular injections of 3% zinc chloride solution during a period of testicular growth artificially stimulated by increased photoperiod. These tumours resemble those previously induced by similar methods in domestic fowl and have histological features in common with spontaneous testicular teratomas in man. - *Author's summary.*

64. Hoover, E. A. (Department of Veterinary Pathology, The Ohio State University, 1925 Coffey Road, Columbus, Ohio), and R. A. Griesmer. 1971. Experimental feline herpesvirus infection in the pregnant cat. Am. J. Path. 65:173-188.

Intravenous inoculation of pregnant cats with feline herpesvirus produced minimal illness but resulted in abortion, intrauterine fetal death and congenital fetal infection. Placental lesions included multiple infarcts in the placental labyrinth, thrombosis of maternal vessels in the endometrium and placenta, and multifocal necrosis of the giant-cell trophoblast and endometrial epithelium in the junctional zone of the placenta associated with eosinophilic intranuclear inclusion bodies. The virus was isolated from all the placentas and uteri but from none of the fetuses aborted 6-9 days after maternal intravenous inoculation. Viral antigen was demonstrated in the uterine vessels and in the junctional zone of the placenta at this time. On postinoculation day 26, viral antigen was demonstrated in the chorioallantoic membrane on the fetal side of the placenta and in the liver of a congenitally infected fetus. Although all 4 pregnant cats inoculated intranasally with feline herpesvirus aborted, neither virus, viral antigen nor significant lesions were detected in the uteri, placentas or fetuses. Abortion after intranasal inoculation was interpreted as a nonspecific reaction secondary to the severe, debilitating upper respiratory disease that occurred. It is concluded that experimental feline herpesvirus infection in the pregnant cat constitutes a promising model for study of the interaction of indigenous herpesviruses with the uterus, placenta and fetus. - *Authors' abstract modified.*

65. Lucas, C. T. (Venereal Disease Research Laboratory, Center for Disease Control, Public Health Service, Atlanta, Georgia), F. Chandler, Jr., J. E. Martin, Jr., and J. D. Schmale. 1971. Transfer of gonococcal urethritis from man to chimpanzee. An animal model for gonorrhea. J. Am. Med. Assn. 216:1612-1617.

Urethral exudate from human males with gonococcal urethritis was transferred to the urethras of three male chimpanzees. The chimpanzees developed gonococcal urethritis, as demonstrated by the presence of a purulent urethral exudate containing gram-negative intracellular diplococci and the recovery of Neisseria gonorrhoeae on bacteriological culture media. The gonococcal urethritis was then transferred from chimpanzee to chimpanzee. One chimpanzee developed gonococcal conjunctivitis, presumably by autoinoculation. All animals developed complement-fixing antibodies to N. gonorrhoeae in their sera. It appears, therefore, that an animal model of gonococcal urethritis has been established. - *Authors' summary.*

66. MacLennan, A. H., J. A. Harris, and R. M. Wynn (University of Illinois at the Medical Center, P.O. Box 6998, Chicago, Illinois 60680). 1971. Menstrual cycle of the baboon. II. Endometrial ultrastructure. Obstet. Gynecol. 38:359-374.

Cyclic ultrastructural changes in the baboon's endometrium have been analyzed quantitatively by stereologic measurements of organelles in electron micrographs. Around the time of ovulation, the total volumes of endoplasmic reticulum and mitochondria increase greatly. At the same

time, individual mitochondria increase in size and nucleoli become more complex. Although the cyclic ultrastructural changes in the baboon's endometrium are similar to those in man, two features unique to the baboon are: a specialized form of endoplasmic reticulum with a multivesicular structure and extremely prominent junctional complexes. The ultrastructural similarity of the endometrium of the baboon and that of man suggests that this monkey may be a suitable physiologic model for the study of human reproduction. - *Authors' abstract.*

67. Mintz, D. H. (Department of Medicine, University of Miami School of Medicine, Miami, Florida 33152), R. A. Chez, and D. L. Hutchinson. 1972. Subhuman primate pregnancy complicated by streptozotocin-induced diabetes mellitus. J. Clin. Invest 51:837-847.

Polydipsia, polyuria, polyphagia, and glucosuria followed the administration of streptozotocin to 6 nonpregnant and 15 pregnant monkeys (*Macaca mulatta*) in the first trimester of pregnancy. The diabetogenic action of the drug was also reflected in an induced but variable deterioration in maternal intravenous glucose tolerance and a marked attenuation of maternal plasma insulin responsiveness to intravenous glycemic stimuli. The products of conception were examined in 29 pregnancies. The neonates and the placentas of the streptozotocin-treated pregnant animals were significantly heavier than average for the period of gestation, polyhydramnios was consistently present, and there was an increase in the incidence of third trimester stillbirths. These and other data provide evidence that maternal glucose intolerance during pregnancy is associated with enhanced fetal and neonatal pancreatic islet cell responsiveness to glucose and mixed amino acids. Although the specific mechanism(s) that alters both the sensitivity and responsiveness of the normal pancreatic fetal islet to insulinogenic stimuli remains unclear, the data do indicate that insulin-dependent maternal hyperglycemia and hyperaminoacidemia separately or in combination could contribute to the fetal hyperinsulinemia of pregnancies complicated by diabetes mellitus. Moreover, the overall experiences with these streptozotocin-treated animals suggest that a subhuman primate model may be available to examine directly the antenatal pathophysiology of abnormal carbohydrate metabolism. - *Authors' abstract.*

RESPIRATORY SYSTEM

68. Nettesheim, P. (Carcinogenesis Program, Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37840), and A. S. Hammons. 1971. Induction of squamous cell carcinoma in the respiratory tract of mice. J. Nat. Cancer Inst. 47:667-701.

A review of the current literature on experimental models used in respiratory carcinogenesis studies indicates that the method of repeated intratracheal injection of large doses of polycyclic hydrocarbons, with which a high incidence of bronchogenic carcinomas can be induced in rats and hamsters, has apparently not been attempted in mice. This communication

reports the induction of squamous cell carcinomas in the respiratory tract of (C57Bl x C3H) F₁ (BC3F₁) and DBA/2 mice by repeated intratracheal injections of 3-methylcholanthrene (MCA). The tumors showed frank invasion and metastasis and were readily transplantable to isogenic recipients. Only 3 of 50 DBA/2 mice developed squamous cell carcinomas at 7 months, after 4 weekly injections of 0.5 mg MCA. In BC3F₁ mice given 6 weekly injections of 0.5 MCA, a tumor incidence of 86% with an induction time of 10-28 weeks was observed. The short induction time (the first carcinoma appeared 4 weeks after the 6th carcinogen injection) makes this tumor system particularly attractive. These findings suggest that the mouse should be reconsidered as an experimental animal for respiratory carcinogenesis studies. The exact origin of the observed respiratory tract carcinomas still needs to be determined. - *Authors' summary modified.*

69. Richerson, H. B. (Allergy and Applied Immunology Section, Department of Internal Medicine, and the Departments of Radiology and Pathology, University of Iowa College of Medicine, Iowa City, Iowa 52240), F. Cheng, and St. C. Bauserman. 1971. Acute experimental hypersensitivity pneumonitis in rabbits. Am. Rev. Resp. Dis. 104:568-575.

An animal model of hypersensitivity pneumonitis is described. Rabbits were sensitized with ovalbumin in complete Freund adjuvant. Three weeks after immunization, the animals were placed in an aerosol chamber and challenged with ovalbumin in 0.15 M sodium chloride aerosolized by ultrasonic nebulization. The amount of antigen retained after challenge was studied using ovalbumin-¹²⁵I and was found to be approximately 0.2 per cent of the total aerosolized antigen. Histologically, lesions in the lungs were seen by 24 hours and had essentially cleared at six days. Abnormalities included thickening of alveolar septa and increases in mononuclear cells, lymphocytes, phagocytic macrophages, and eosinophilic granulocytes within alveolar walls and spaces. Distribution of these lesions was patchy, involving most conspicuously the alveolar ducts distal to the termination of respiratory mucosa, thus illustrating an allergic alveolitis. Other histologic abnormalities included peribronchiolitis and vasculitis. No similar lesions were seen in unsensitized, challenged animals or in sensitized, unchallenged control animals. This model allows study of the pathogenesis of hypersensitivity pneumonitis and elaboration of the role played by the lung in various types of immune damage. - *Authors' summary.*

SKIN AND ADNEXA

70. Flatt, R. E. (Department of Veterinary Pathology, College of Veterinary Medicine, Iowa State University, Ames, Iowa 50010), L. R. Nelson, and C. C. Middleton. 1972. Melanotic lesions in the internal organs of miniature swine. Arch. Path. 93:71-75.

Twenty Sinclair (S-1) miniature swine with pigmented skin lesions were killed and necropsied. Melanotic lesions were found regularly in the regional lymph nodes and occasionally in the brain, meninges, lungs, liver, urinary

bladder, heart, spleen, adrenals, ovaries, skeletal muscle, bone, stomach, and small intestine. Sinclair (S-1) miniature swine are a potential model for the study of melanin metabolism and melanomas. - *Authors' abstract.*

71. Selmanowitz, V. J. (Dermatology Research Unit, Orentreich Foundation for the Advancement of Science, New York, New York 10021). 1970. Ectodermal dysplasias in cattle: Analogues in man. Brit. J. Dermatol. 84:258-265.

Epitheliogenesis imperfecta in cattle and horses resembles the human disorders aplasia cutis congenita, focal dermal hypoplasia and a variant of epidermolysis bullosa with congenital localized absence of skin. A severe form of congenital ichthyosis in cattle is mirrored in morphology and gravity by ichthyosis foetalis (harlequin foetus) of human beings, and a somewhat milder form in cattle has a human counterpart in ichthyosis congenita. In cattle, dysplasias of the cutaneous appendages (hair follicles, arrector pili muscles, sebaceous glands, sweat glands) are classified into the following types: ichthyotic hyperkeratosis (recessive); patterned congenital alopecia: follicular-glandular dysplasia (recessive); tardive symmetrical alopecia (recessive); streaked hairlessness (semi-dominant, sex-linked, lethal); woolly semi-hairlessness (recessive); follicular-glandular dysplasia, anodontia and macroglossia (sex-linked recessive); and hypotrichosis with anodontia. In several of these types there may be analogues in man. - *Author's abstract.*

72. Shelley, W. B. (Department of Dermatology, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania 19104), and C. J. Raque. 1971. Experimental zirconium granulomas and chondromas in CBA mice. J. Invest. Dermatol. 57:411-417.

The intradermal as well as intraperitoneal injection of zirconium salts in CBA/J mice produced local foreign body type granulomas which regularly persisted for over eight months. Granulomas produced were similar to the experimental silica granuloma in man. However, none of the animals exhibited evidence of the late delayed immune type of epithelioid cell granulomatous hypersensitivity such as has been induced experimentally in man. Benign chondromas developed locally in the ear cartilage plate in half of the mice who had received zirconium injections in this area. The authors indicate that this is the first technique of experimentally producing chondromas. - *Authors' abstract modified.*

URINARY SYSTEM

73. Burch, G. E. (Charity Hospital of Louisiana, and Tulane University School of Medicine, New Orleans, Louisiana 70112), C. Y. Tsui, and J. M. Harb. 1972. The early renal lesions of mice infected with encephalomyocarditis virus. Lab. Invest. 26:163-172.

The early pathologic changes of the kidney with significant glomerular mesangial cell, tubular epithelial cell, and interstitial cell necrosis are described in mice infected with the encephalomyocarditis (EMC) virus.

In addition, viral crystals are demonstrated electron microscopically in interstitial and tubular epithelial cells - findings never reported before. These studies show that the EMC virus can cause glomerulonephritis in mice. The mechanisms by which the virus damages the kidney may include an antigen-antibody reaction, a direct viral invasion of tissues of the kidney, and/or an autoimmune reaction established by the virus. Because EMC virus can readily damage the renal glomeruli of newborn mice, damage which may later develop into glomerulonephritis, the authors have postulated that viruses may also produce renal disease in man, including glomerulonephritis. Glomerulonephritis produced directly by viral invasion of glomeruli needs further investigation. Thus, mice infected with EMC virus are good models for the study of glomerulonephritis caused by direct viral invasion of the kidneys, especially since the EMC virus produces distinct crystals in the infected tissues, which can be readily identified electron microscopically. - *Authors' abstract modified.*

74. Fox, R. R. (The Jackson Laboratory, Bar Harbor, Maine), W. L. Krinsky, and D. D. Crary. 1971. Hereditary cortical renal cysts in the rabbit. J. Hered. 62:105-109.

Necropsies in eleven strains of rabbits at The Jackson Laboratory revealed a high incidence of cortical renal cysts in strain III_{VO}. These cysts are similar to the "simple cysts" in man. They occur primarily in adult life and affect the normal structure of the renal cortex, but do not appear to be associated with pathological changes in the normal functioning of the kidney. In the rabbit these are inherited and are due most probably to a single autosomal recessive gene with incomplete penetrance. We have assigned the symbol re (renal cysts) to this gene. This finding of cortical renal cysts in the rabbit provides a new model for the study of simple cysts in man. - *Authors' summary.*

75. Harman, J. W. (Department of Pathology, University College, Dublin 2, Ireland). 1970. Chronic glomerulonephritis and the nephrotic syndrome in rats with N,N'-diacetylbenzidine. J. Path. 104:119-128.

A nephrotic syndrome has been induced in albino rats by feeding them with a diet containing N,N'-diacetylbenzidine. Glomerular lesions appeared rapidly and consisted of florid epithelial crescents, progressive sclerosis and obliteration of many glomeruli. In females, the severe proteinuria was rapidly followed by hypoproteinaemia, hyperlipaemia, generalised oedema and severe anaemia; renal insufficiency with urea retention ensued. In males, similar renal lesions developed more slowly and though the proteinuria was eventually as heavy as in females, they manifested no features of nephrosis. The experimental syndrome resembles morphologically a form of rapidly progressive human glomerulonephritis. - *Author's summary.*

76. Klassen, J. (Department of Pathology, State University of New York at Buffalo, Buffalo, New York 14214), T. Sugisaki, F. Milgrom, and R. T. McCluskey. 1971. Studies on multiple renal lesions in Heymann nephritis. Lab. Invest. 25:577-585.

Immunization of rats with homologous kidney suspension in Freund's

complete adjuvant plus Bordetella pertussis administered in an adjacent site resulted in severe autologous immune complex glomerular disease, as well as in several forms of tubular and interstitial damage, and in some instances in renal vein thrombosis. In comparison with previously described immunizing procedures employing renal tissue in Freund's adjuvant but without injections of B. pertussis proteinuria and the glomerular disease appeared earlier and were manifested by more conspicuous histologic changes, principally capillary wall thickening and mesangial cell hypercellularity. In addition, it was possible to induce the disease in Buffalo rats, which are resistant to the induction of nephritis using only Freund's adjuvant. The tubular lesions were detectable by in vivo accumulation of IgG and/or β 1C. Four patterns were observed: (1) granular deposits of IgG and β 1C along the basement membrane of proximal tubules, (2) accumulation of IgG and often β 1C as well in the brush border of proximal tubules, (3 and 4) accumulation of IgG but not of β 1C in basilar portions of tubules in the ascending thick limb of loops of Henle and in distal convoluted tubules. Animals with the last three patterns of staining displayed circulating autoantibodies which were capable of reacting in vitro with the corresponding segments of the nephron. In some animals, histologic evidence of tubular damage was apparent in the form of nuclear hyperchromatism, vacuolation or basophilia of cytoplasm, and loss of periodic acid-Schiff staining of brush borders. Interstitial infiltrates of mononuclear cells, principally lymphocytes, were found in many animals in the outer medulla and cortex, suggesting the participation of cell-mediated mechanisms in the renal disease. The same immunization procedure with liver or small bowel failed to produce renal lesions, providing evidence that the antigen responsible for autologous immune complex disease is not present in these tissues. This highly efficient, yet simple, method of inducing severe autologous immune complex nephritis, as well as renal tubular and interstitial lesions, provides a model which suggests probable mechanisms for similar immune deposits that occur in patients with lupus nephritis, rapidly progressive and membranoproliferative glomerulonephritis, and Sjogren's syndrome. - *Authors' abstract modified.*

77. Kuntz, R. E. (Division of Microbiology and Infectious Diseases, Southwest Foundation for Research and Education, San Antonio, Texas 78228), A. W. Cheever, and B. J. Myers. 1972. Proliferative epithelial lesions of the urinary bladder of nonhuman primates infected with *Schistosoma haematobium*. J. Nat. Cancer Inst. 48:223-235.

Lesions with the morphologic characteristics of papillary transitional cell carcinomas of the urinary bladder were found in a talapoin monkey and a capuchin monkey infected with *Schistosoma haematobium*, and a papilloma of the ureter was found in an infected African baboon. Marked proliferation and squamous metaplasia of the bladder epithelium were seen in 2 squirrel monkeys and in 1 capuchin monkey. These lesions were seen 5-24 months after infection of the monkeys. Epithelial proliferation was topographically related to the presence of *S. haematobium* eggs in the lamina propria of the bladder. This and the absence of reports of spontaneous bladder cancer in monkeys suggest that the proliferative lesions were caused by the schistosome infection. The relatively small number of capuchin, talapoin, and squirrel monkeys at risk during the period in which tumors developed suggests that infected animals of these species may offer useful models for the study of bladder cancer. - *Authors' summary.*

78. Lyon, M. F. (M. R. C. Radiobiology Unit, Harwell, Didcot, Berkshire, England), and E. V. Hulse. 1970. An inherited kidney disease of mice resembling human nephronophthisis. J. Med. Genet. 8:41-48.

An inherited kidney disease, which arose spontaneously in an inbred strain of mice, appears to be due to an autosomal recessive gene which has been given the name and symbol *kidney disease*, *kd*. This gene is located in linkage group X, and shows about 16.4% recombination with grizzled (*gr*). Clinically, the disease was first detectable at about 10 weeks of age by increased proteinuria. This was followed over several weeks by excessive drinking, dilute urine, loss of weight, anaemia, and death in uraemia usually at 5 to 7 months. Pathologically, areas of tubular atrophy alternated with areas of dilated tubules, often containing hyaline casts. The glomeruli were sclerotic in the areas of tubular atrophy and the cells of some of the atrophied tubules contained haemosiderin. Epithelial hyaline droplet change occurred in the earliest stages. In clinical, genetical, and pathological respects the mouse disease strongly resembled the human inherited kidney disease, nephronophthisis. - *Authors' summary modified.*

79. Markovic, B. L. (Institute for Health Protection, Gnjilane, Yugoslavia), and M. D. Arambasic. 1968. Experimental chronic interstitial nephritis compared with endemic human nephropathy. J. Path. 103:35-39.

This paper describes the experimental induction in guinea-pigs of chronic interstitial nephritis by pure silica (SiO_2). Quartz was ground mechanically into microparticles about 1-3 μm in diameter, added to "clean" drinking water, and given to animals to drink over several months. Under these experimental conditions the guinea-pigs developed renal pathological changes similar to those found in man in Yugoslavia - the endemic nephropathy caused by rock erosion in village communities on the banks of the lower reaches of large rivers. The renal lesion is caused by release of silicic acid, which affects the kidneys chemically. The silicate causes two processes in the kidneys: a dystrophic-atrophic lesion in the parenchyma, and a proliferative-inflammatory one in the interstitial tissue. The dose of silicate suspension determines the pathogenic effects produced. The concentration of the silicate suspension, the pH of the urine, the age of the animal and the period of exposure are important factors. In the course of time the kidneys became atrophic and fibrotic. - *Authors' summary.*

80. Počysil, C. (Second Institute of Pathology, Faculty of General Medicine, Charles University and Research Institute for Pharmacy and Biochemistry, Prague, Czechoslovakia), and L. Kouřcková. 1972. Experimental xanthogranulomatous pyelonephritis. Invest. Urol. 9:313-318.

Permanent ligation of the ureter and a single intravenous injection of a suspension of *Escherichia coli* 04:H5 successfully produced xanthogranulomatous pyelonephritis in 23 out of 30 rats. Xanthogranulomatous foci usually began to develop after the first month of the experiment. They had a clearly postinflammatory character and were evidently the result of the local resorption process in renal suppuration. Retention of pus in the renal pelvis undoubtedly contributed to their development. The amount of fatty material in the lipophages in xanthogranulomatous pyelonephritis

in rats is slightly smaller than in man. In addition in the 3rd and 4th month of the experiment periodic acid-Schiff (PAS) positive histiocytes constantly appeared at the periphery of the xanthogranulomatous pyelonephritis and mostly in small clusters. Despite these differences, the obstructive form of suppurative pyelonephritis is a suitable model for the study of the problem of xanthogranulomatous pyelonephritis. - *Authors' abstract.*

81. Vlachos, J. D. (Department of Pathology, Evangelismos Medical Center, Athens, Greece). 1972. A new experimental model of polycystic kidneys. Similarity to a human variety. Am. J. Dis. Child. 123:118-120.

The production of polycystic renal disease in newborn rabbits by the use of a long-acting corticosteroid, fluprednisolone (Predef 2x [Greece]; Alphadrol; comparable US product) as reported earlier by other investigators has been confirmed and extended. Rabbits followed up to 3 months of age show disappearance of the cysts. Comparison with "glomerular" type human polycystic kidney shows important similarities. In summary, evidence is presented that the cardinal features of this experimental model are similar to that observed in two previously reported cases of human polycystic kidneys and to a third similar case subsequently observed. - *Author's abstract modified.*

82. Voller, A. (Nuffield Institute of Comparative Medicine, London, England), C. C. Draper, T. Shwe, and M. S. R. Hutt. 1971. Nephrotic syndrome in monkey infected with human quartan malaria. Brit. Med. J. 4:208-210.

A splenectomized aotus monkey infected with human quartan malaria (Plasmodium malariae) developed oedema and proteinuria. Histological examination revealed a generalized diffuse glomerulonephritis and immuno-fluorescent staining showed granular deposits of IgM in the glomeruli. The pathological picture resembled that shown by human patients with the quartan malaria nephrotic syndrome. The occurrence of the syndrome in a splenectomized aotus monkey suggests that it may be possible, using this model, to determine the immunological conditions that give rise to the nephrotic syndrome in human P. malariae infections. - *Authors' summary modified.*

83. Warner, N. L. 1971. Spontaneous hydronephrosis in the inbred mouse strain NZC¹. Aust. J. Exp. Biol. Med. Sci. 49:477-480.

An inbred strain of mice NZC was found to have a high incidence of spontaneous hydronephrosis with up to 56% of males and 81% of females showing some stage of the disease. Either unilateral or bilateral hydronephrosis was found in mice between 80 and 660 days of age, and in most cases did not appear to have had a marked effect on survival time. Blood urea nitrogen levels in these mice were slightly elevated. NZC F₁ hybrid mice did not show the disease, nor did backcross progeny to normal parent strains. However, 43% of backcross progeny to the NZC parent showed hydronephrosis. These results indicate that a single autosomal recessive gene controls the inheritance of this renal disorder. The relation of this to other reported cases of hydronephrosis and to other genetic disorders

in NZ mice is discussed. The results presented in this paper further extend the known cases where a genetically controlled process of hydronephrosis can occur without any obvious obstructive cause. These mice may accordingly be a most suitable laboratory model in which to further explore the detailed process whereby this condition can occur in both man and animals. - *Author's summary modified.*

AUTOIMMUNE DISEASES

84. Fabris, N. (Schweizerisches Forschungsinstitut, Medizinische Abteilung, 7270 Davos-Platz, Switzerland), W. Pierpaoli, and E. Sorkin. 1971. Hormones and the immunological capacity. III. The immunodeficiency disease of the hypopituitary Snell-Bagg dwarf mouse. Clin. Exp. Immunol. 9:209-225.

The naturally occurring immunodeficiency syndrome of the hypopituitary Snell-Bagg dwarf mouse has been characterized. The immunopathological aspects of this syndrome derive primarily from an arrested ontogenetic development of the thymus. The alteration of the thymus function is caused by the failure of the pituitary to produce certain hormones, especially somatotrophic hormone. The relation of this syndrome of the dwarf mouse to human immunodeficiency diseases and endocrinopathies is discussed. - *Authors' summary.*

85. Maclaurin, B. P. (Department of Medicine, University of Otago Medical School, Dunedin, New Zealand). 1971. Controlled study of autoimmunization against liver in inbred rat strains. Gut 12:458-464.

By prolonged immunization of an inbred rat strain with isologous liver homogenate in Freund's complete adjuvant a low grade autoimmune 'cholangitis' with periductular fibrosis has been demonstrated. The lesion could be transferred to isogeneic animals by serial spleen cell injections and was associated with mild but variable delayed skin sensitivity to a supernatant fraction of the liver homogenate. It is thought to be due to a combined cellular and antibody-mediated immune response, directed against bile duct constituents. Pulmonary (peribronchial) lesions have also been described in the same animals and are considered to be of similar origin and to represent a cross reaction with tissue of similar embryological (entodermal) origin. This appears to be the first description of periductular hepatic fibrosis clearly resulting from an autoimmune reaction and may provide a model for further study of rather similar histological reactions known to occur in man. - *Author's summary.*

86. Mellors, R. C. (Hospital for Special Surgery, Philip D. Wilson Research Foundation, Department of Pathology, Cornell University Medical College, New York, New York 10021). 1971. Wild-type gross leukemia virus and heritable autoimmune disease of New Zealand mice. Am. J. Clin. Path. 56:270-279.

NZB and (NZB x NZW) F₁ hybrid mice are a widely studied model of several, sometimes clinically related, human diseases of unknown etiology.

These diseases include idiopathic glomerulonephritis, systemic lupus erythematosus, related connective-tissue and autoimmune diseases, and malignant lymphoma. The present work on the animal model reveals interrelated viral (Gross leukemia virus), genetic, and immunologic determinants of disease. These studies may contribute to the further elucidation of the cause, nature, treatment, and prevention of one or more of the corresponding human diseases. - *Author's abstract.*

87. Weiden, P. L. (Metabolism Branch, National Cancer Institute, National Institutes of Health, Bethesda, Maryland 20014), and M. Blaese. 1971. Hemolytic anemia in agammaglobulinemic chickens: A model of "autoimmune" disease in immune deficiency. J. Immunol. 107:1004-1013.

Agammaglobulinemic chickens, which have less than 0.5% of normal immunoglobulin levels, develop a hemolytic anemia with variable frequency. Autologous red blood cell (RBC) survival studies using DFP-³H-labeled cells demonstrated a survival of 15 days in agammaglobulinemic anemic chickens compared with 30 days in normal chickens. Homologous survival studies demonstrated normal survival of normal RBC in agammaglobulinemic anemic chickens and shortened survival of agammaglobulinemic anemic RBC (Ay-RBC) in three of four normal chickens. Ay-RBC could be specifically agglutinated by an antibody present in the normal serum of several species. Several lines of evidence indicate that chicken immunoglobulin is not on the Ay-RBC surface and hence not involved in the agglutination reactions observed. Infectious agents were not identified in the agammaglobulinemic anemic chickens. The absence of an autoantibody in this hemolytic anemia, which is similar to that described in other species as "autoimmune," was consistent with the concept that autoantibodies may not play a primary pathogenetic role in at least some phenomena generally characterized as autoimmune. The most likely etiologic factor in the hemolytic anemia was thought to be an unidentified infectious agent, although the contribution of the absence of immunoglobulin *per se* could not be adequately evaluated. The pertinence of the use of the agammaglobulinemic chicken as a model for "autoimmune" phenomena in immune deficient humans was discussed, and the necessity of proper controls in using anti-immunoglobulin sera in the investigation of hemolytic anemias was stressed. - *Author's abstract.*

BACTERIAL DISEASES

88. Dalldorf, F. G. (Department of Pathology, School of Medicine, University of North Carolina, Chapel Hill, North Carolina 27514), A. F. Kaufmann, and P. S. Brachman. 1971. Woolsorters' disease. An experimental model. Arch. Path. 92:418-426.

Ninety-one cynomolgus monkeys were exposed for up to 32 days to dusty air from a mill processing imported goat hair known to contain anthrax spores. Twenty-three monkeys contracted inhalation anthrax. The morphologic study of the infected monkeys supports the notion that, in most cases of inhalation anthrax, spores are carried to the mediastinal lymph nodes, where they germinate and produce a primary lymphatic infection. The large bacteria

quickly invade the bloodstream and cause fatal septicemia. The anthrax bacillus produces a toxin which often causes marked local vascular injury with edema, hemorrhage, and thrombosis. In anthrax septicemia the toxin causes generalized vascular injury with widespread capillary thrombosis, circulatory failure, shock, and death. The morphologic findings in this experimental model of Woolsorters' disease not only give evidence of the pathogenesis and pathophysiology of inhalation anthrax but also illustrate a basic disease mechanism of most bacterial infections. - *Authors' abstract modified.*

NUTRITIONAL - METABOLIC DISEASES

89. Davies R. E. (Skin and Cancer Hospital of Philadelphia, Temple University Health Sciences Center, Philadelphia, Pennsylvania 19140), W. A. Austin and M. K. Logani. 1971. The rhino mutant mouse as an experimental tool Trans. N.Y. Acad. Sci. Ser. II, 33:680-693.

Although the most obvious characteristics of the rhino mouse are the absence of hair and the wrinkling of the skin, the basic metabolic defect may well be one of lipid metabolism. The deficient triglyceride storage, the massive accumulation of waxes, and the relatively large amount of lathosterol ester (with no accompanying members of the desmosterol synthesis route) all suggest some gross abnormality of lipid metabolism. The response of the rhino to vitamin A, including the striking sensitivity to toxicity, may also indicate abnormalities of lipid handling. Thus, the rhino mouse may be a useful tool for a variety of studies other than those based on its abnormal skin and its sensitivity to carcinogens. - *Authors' abstract.*

90. Duncan, H. (Division of Rheumatology, Henry Ford Hospital, Animal Care Division, 2799 West Grand Boulevard, Detroit, Michigan 48202), and A. S. Curtiss. 1971. Observations on uric acid transport in man, the Dalmation and the non-Dalmation dog. Henry Ford Hosp. Med. J. 19:105-114.

The urinary output of uric acid from the purebred Dalmation is similar in amount to that in man. Also, this breed of dog has a higher plasma uric acid level than other dogs and, like man, this hyperuricemia is accompanied more frequently with renal and bladder lithiasis. Allopurinol is effective therapy in both man and dog. Study of the fate of uric acid in the Dalmation shows that the liver does not oxidize the available uric acid completely although it is capable of doing so when liver homogenates are studied. Consequently, the hepatic cellular membrane appears impermeable, or partially so, to uric acid. The possibility of a general membrane transport problem similar to that encountered at the liver cell has not been confirmed with studies of red cells in the Dalmation. This dog shows some similarities to certain rare clinical human diseases with deafness, cardiac arrhythmias and renal tubule leak of uric acid, all of which offer ample opportunity for close and detailed examination as clinical models in biochemical, physiological, pathological and genetic studies. - *Authors' abstract.*

91. Levin, E. Y. (Johns Hopkins University School of Medicine, Baltimore, Maryland 21204), and V. Flyger. 1971. Uroporphyrinogen III cosynthetase activity in the fox squirrel (Sciurus niger). Science 174:59-60.

The activity of uroporphyrinogen III cosynthetase in hemolyzates and tissue extracts from fox squirrels is much less than in similar preparations from gray squirrels. Low activity of this enzyme explains the production of large amounts of uroporphyrin I by the fox squirrel. Members of this species thus provide a small animal model for studies of congenital erythropoietic porphyria, a hereditary disease of man and cattle which is associated with a similar partial deficiency of uroporphyrinogen III cosynthetase. - *Authors' abstract.*

92. Nitzan, M. (Section of Endocrinology, Metabolism and Nutrition, Department of Medicine, Northwestern University Medical School, Chicago, Illinois), B. E. Metzger and J. F. Wilber. 1971. The effects of acute uremia on plasma glucose, insulin and growth hormone in the rat. Life Sci. 10:671-676.

The effects of acute uremic syndrome upon plasma glucose, insulin and growth hormone were evaluated in the fasted rat 24 hours following bilateral nephrectomy. Appropriate control studies were instituted to correct for the non-specific effects of surgical intervention. The mean levels of plasma glucose, IRI and GH, as well as insulin to glucose ratio were significantly higher in the uremic animals than in the sham-operated controls. The fasting hyperglycemia in the presence of high levels of circulating IRI observed in the nephrectomized rats suggest impaired responsiveness of the peripheral tissues to the action of insulin. Since similar findings have been reported in chronic renal failure in the human, it is suggested that the acutely uremic rat might be employed as an experimental model for further elucidating the underlying mechanisms of glucose intolerance in uremia. - *Authors' abstract.*

93. Pieper, W. A. (Yerkes Regional Primate Research Center, Emory University, Atlanta, Georgia 30322), M. J. Skeen, H. M. McClure, and P. G. Bourne. 1972. The chimpanzee as an animal model for investigating alcoholism. Science 176:71-73.

Young chimpanzees (Pan troglodytes) will accept ethanol in quantities sufficient to produce symptoms of withdrawal when ethanol is subsequently discontinued. Mild to severe symptoms of physical dependence, including grand mal seizures, are observed when ethanol is abruptly withdrawn after 6 to 10 weeks of chronic oral intake. In addition, the rate of disappearance of ethanol in blood increased during periods of chronic ingestion, an indication of developing metabolic tolerance. These results suggest that the young chimpanzee may be a suitable model for experimental studies of alcoholism. - *Authors' abstract.*

94. Tschudy, D. P. (Metabolism Branch, National Cancer Institute, National Institutes of Health, Bethesda, Maryland 20014), and H. L. Bonkowsky. 1972. Experimental porphyria. Fed. Proc. 31:147-159.

A number of chemical agents, including certain drugs and steroids, can produce biochemical disorders in various animal species (mice, rats, rabbits, guinea pigs, dogs) which resemble different types of hepatic porphyria in man. The main agents used to produce experimental porphyria are allylisopropylactamide, dicarbethoxydihydrocollidine, griseofulvin, and hexachlorobenzene. The porphyrias produced by these agents are discussed in this paper. The experimental porphyrias also provide excellent systems for study of a complex control mechanism in mammalian liver. Thus, it has been shown that drugs, diet, hormones, and iron all affect the induction of the mitochondrial enzyme δ -amino-levulinic acid synthetase (ALA synthetase) which plays a major role in the control of heme biosynthesis. In addition, clinical observations provided the basis for the development of experimental porphyria which in turn has provided information that has had significant clinical application. A close interrelationship between clinical observations and basic research is seen in the history of the development and use of the experimental porphyrias. - *Authors' abstract.*

95. Zuckerman, B. M. (Laboratory of Experimental Biology, University of Massachusetts, East Wareham, Massachusetts), S. Himmelhoch, B. Nelson, J. Epstein, and M. Kisiel. 1971. Aging in *Caenorhabditis briggsae*. *Nematologica* 17:478-487.

Caenorhabditis briggsae was used as a model to study aging of a metazoan under gnotobiotic conditions. At higher temperatures nematodes were shorter-lived and had a shorter generation time. Nematodes moved more slowly as they aged. Physiologic aging was marked by a decreased ability to withstand osmotic stress, a possible increase in the body's internal solute concentration, and increased sensitivity to formaldehyde. These results suggest that the ability to osmoregulate and the permeability of the body wall are altered during senescence. The interchordal hypodermis, as well as the chordal hypodermis, contained fairly abundant structures having biosynthetic activity. During aging mitochondria of the hypodermis degenerated, some areas of the thin hypodermal band thickened and lysosome-like bodies formed in the interchordal hypodermis. Changes in osmoregulatory and excretory mechanisms are probably associated with deterioration of the hypodermis organelles. - *Authors' abstract.*

ONCOLOGY

96. Kiseleva, N. S. (Institute for Experimental Clinical Oncology, Moscow, U.S.S.R.). 1971. A transplantable metastasizing tumor strain of Syrian hamsters. *Vop. Onkol.* 17:64-69.

Specific features of metastases from a transplantable dimethylbenz(a)-anthracene-induced Syrian hamster sarcoma maintained in tissue culture for 123 generations were investigated. Tumor tissue was inoculated s.c. to 33 1-month-old Syrian hamsters (0.2 ml of a 25% suspension in physiological solution). The tumor strain elicited 100% transplantability and a fast growth rate after a latency period of 4-6 days. The neoplastic tissue consisted of large polymorphous cells with vacuolated nuclei and high mitotic activity; the stroma was poor and of rather fibrillar consistency. Metastases located in the axillary lymph nodes were observed in 29 (90.6%) of 32 tumor-bearing hamsters 10 days following inoculation. Bilateral metastases were found in the pararenal (50% incidence) and in the lumbar lymph nodes (53%

incidence) 15 days following inoculation. Twelve hamsters (37%) were found to have developed metastases in the lung and, later, 11 hamsters developed metastases in the inguinal, 11 in the cervical and 9 in the paratracheal lymph nodes. No metastases were seen in the liver, kidney or spleen. Three morphologically distinct stages could be established for the development of metastases at the respective sites: 1) a stage of subcapular growth of the tumor within the lymph node; 2) a stage of "break-through" of the tumor mass directed towards the central region of the lymph node with a gradual substitution of the lymphoid tissue by tumor tissue; 3) a stage of total substitution of the lymphoid tissue by tumor tissue whereby morphological integrity of the lymph node capsule is maintained. The transplantable Syrian hamster sarcoma is thought to provide an experimental model for lymphatic metastases. - *Author's abstract.*

97. Larson, V. M. (Division of Virus and Cell Biology Research, Merck Institute for Therapeutic Research, West Point, Pennsylvania), W. R. Clark, and M. R. Hilleman. 1971. Comparative studies of SV₄₀ and adenovirus oncogenesis in random bred and inbred hamsters. Proc. Soc. Exp. Biol. Med. 137:607-613.

Inbred LSH and MHA hamsters were compared with random bred LVG hamsters for susceptibility to induction of tumor by SV₄₀, adenovirus 7, or adenovirus 12 viruses and for appearance of tumor after homologous transplantation. The LSH inbred strain proved superior to the MHA inbred line in terms of susceptibility to induction of tumor by SV₄₀ and adenovirus 7 virus and showed a shorter latent period after transplant with homologous SV₄₀ virus tumor. The LSH animals were also somewhat better than MHA hamsters from the point of view of husbandry. The susceptibilities of the inbred LSH and random bred LVG animals to induction of tumor by viruses were similar and the transplantation characteristics of tumors evolved in the two breeds of animals were approximately the same. The inbred LSH hamster provides a satisfactory model for induction of tumor by virus and for investigations of transplant tumor immunology employing a truly syngeneic system. - *Authors' summary.*

PARASITIC DISEASES

98. Von Lichtenberg, F. (Peter Bent Brigham Hospital, Boston, Massachusetts 02115), E. H. Sadun, A. W. Cheever, D. G. Erickson, A. J. Johnson, and H. W. Boyce. 1971. Experimental infection with Schistosoma japonicum in chimpanzees. Parasitologic, clinical, serologic, and pathological observations. Am. J. Trop. Med. Hyg. 20:850-893.

Parasitologic, serologic, pathologic, biochemical and clinical studies were conducted in 15 chimpanzees exposed to Schistosoma japonicum cercariae. Numerous viable eggs were passed in the feces after a prepatent period of 5 to 8 weeks. Worm recoveries at autopsy varied considerably, but no evidence was found of a reduction in worm burdens with infections up to 17 months duration. No consistent difference was observed in the percent recovery and location of worms in animals exposed only once or in those exposed repeatedly. Most eggs in tissues were found in the liver and large intestine, but numerous eggs were also present in the small intestine and lungs of heavily infected

animals. Nearly normal hepatic blood flow was maintained via the hepatic artery even in animals with completely obstructed intrahepatic portal branches. Well-developed portasystemic collateral venous channels effectively decompressed the portal system. Hepatomegaly and severe portal fibrosis were common gross findings; variable degrees of pipe-stem fibrosis consistent with infection intensity were found. The development of pipe-stem fibrosis was particularly rapid and destructive, and hepatic lesions were more inflammatory and polymorphous with S. japonicum than has been reported with Schistosoma mansoni. Marked intestinal lesions were present in a variable and patchy segmental distribution. Glomerular lesions occurred in most chimpanzees with pipe-stem fibrosis, and the prothrombin time was abnormal in several of the more severely diseased animals. Marked hypoalbuminemia and hypergammaglobulinemia were frequent. Hypoglycemia and uremia appeared to be important factors in some infected animals. The chimpanzee was a particularly valuable model for studies on the pathogenesis of schistosomiasis japonica. - *Authors' abstract.*

TERATOLOGY

99. Selby, L. A. (Environmental Health Surveillance Center, School of Veterinary Medicine, University of Missouri, Columbia, Missouri 65201), H. C. Hopps, and L. D. Edmonds. 1971. Comparative aspects of congenital malformations in man and swine. J. Am. Vet. Med. Assn. 159:1485-1490.

An in-depth study of congenital anomalies of swine was done to establish the usefulness of this species as a model for similar studies in man. The malformed swine were collected from cooperative farms in Missouri over a period of 4 1/2 years. The swine were examined for gross defects and classified according to the body system involved. An existing classification system for malformations in human beings was found to be generally satisfactory, but it was necessary to expand the system for certain categories, e.g., limb anomalies. - *Authors' summary.*

MISCELLANEOUS

100. Ciaranello, R. D. (Department of Psychiatry, Stanford University School of Medicine, Stanford, California 94305), J. N. Dornbusch, and J. D. Barchas. 1972. Rapid increase of phenylethanolamine N-methyltransferase by environmental stress in an inbred mouse strain. Science 175:789-790.

The activity of phenylethanolamine N-methyltransferase in mice of the C57Bl/Ka strain was determined after a 4°C stress. The enzyme activity increased 1.2-fold at the end of 3 hours and by 1.4-fold by the end of 6 hours of the stress. The results are in contrast to those from other species with intact animals in which the enzyme changes only after several days of chronic stress. Cycloheximide prevents the rise in enzyme activity, suggesting the increase may be due to protein synthesis. The increase may provide a model system for studying regulation of catecholamine biosynthetic enzymes. - *Authors' abstract.*

101. Jones, E. W. (Departments of Medicine and Surgery, College of Veterinary Medicine, Oklahoma State University, Stillwater, Oklahoma 74074), T. E. Nelson, I. L. Anderson, D. D. Kerr, and T. K. Burnap. 1972. Malignant hyperthermia of swine. Anesthesiology 36:42-51.

Inherited susceptibility to malignant hyperthermia has been recognized in Poland China swine. Clinical and laboratory studies were made to compare the syndrome with that observed in man and in other breeds of swine in South Africa and Europe. Malignant-hyperthermia-susceptible (MHS) swine were identified by increased ATP depletion in biopsied muscle studied in vitro. MHS and related swine had elevated serum creatine phosphokinase values compared with control swine (MHS swine $\bar{x}$ 2,435 IU/l; MHS-related swine $\bar{x}$ 1,260 IU/l; control swine $\bar{x}$ 144 IU/l). The syndrome was triggered by administration of halothane and of succinylcholine chloride. Resulting clinical responses, in order of appearance, were tachycardia, hyperventilation, skeletal muscle rigidity, hyperthermia, cardiac arrhythmias, and death. Blood chemical responses which occurred early in the syndrome included hypercapnia, acidosis, elevated plasma inorganic phosphorus, and lactic acidemia. The malignant hyperthermia syndrome in this breed of swine appears similar to that in Landrace and Pietrain swine, and in man. The Poland China swine is an appropriate animal model for the study of this disease. - *Authors' abstract*.

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APPENDIX

The following reports of conferences and symposia contain papers that pertain to animal models or genetic stocks.

ILAR PUBLICATIONS

During the past five years, ILAR has sponsored five symposia on "Animal Models for Biomedical Research" to acquaint biomedical investigators with the unique animal models that exist for diverse biomedical needs. The proceedings of these symposia have been published by the National Academy of Sciences. The papers stress the specific genetic, physiologic, and pathologic traits or conditions in particular species or strains of animals that make them appropriate and unique research tools with which to gain insight into parallel human conditions or basic biomedical phenomena. (Available from the Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.)

The laboratory animal in gerontological research. 1968. NAS, Washington, D.C. ISBN 0-309-01591-X. 110 p., paper, \$4.50. Held in St. Petersburg, November 10, 1967, with the cooperation of The Gerontological Society, Inc.

Sulkin, N. M. The needs of the gerontologist for laboratory animals. p. 1-7.

Strong, L. C. The origin of some inbred mice: Genetic selection of strains for gerontological research. p. 8-20.

Cohen, B. J. Effects of environment on longevity in rats and mice. p. 21-29.

Bustad, L. K., L. S. Rosenblatt, and J. L. Palotay. The use of miniature swine in gerontological research. p. 30-47.

Howes, J. R. Potential use of Coturnix in gerontological research. p. 48-51.

Wostmann, B. S. Germ-free versus non-germ-free animals in gerontological research. p. 52-61.

Bullock, B. C., K. L. Banks, and P. J. Manning. Common lesions in the aged rat. p. 62-82.

Jones, T. C. and C. E. Gilmore. Pathologic findings in aged dogs and cats. p. 83-97.

Manning, P. J. and K. L. Banks. The effects of transportation on the aged rat. p. 98-103.

Clarkson, T. B. Summary: The laboratory animal in gerontological research. p. 104-108.

Animal models for biomedical research. 1968. NAS, Washington, D.C. 169 p., paper (out of print). Held in Dallas, July 10, 1967, cosponsored by the American College of Laboratory Animal Medicine (ACLAM).

PART I ANIMALS WITH DISEASES OR ABNORMALITIES

Squire, R. A. and E. C. Melby, Jr. Naturally occurring canine and feline lymphomas as biomedical models. p. 3-13.

Hackel, D. B., E. Mikat, H. Lebovitz, and K. Schmidt-Nielsen. Animal models of diabetes mellitus, with special reference to the sand rat (Psammomys obesus). p. 14-20.

Lewis, R. M. Models of autoimmunity: Canine systemic lupus erythematosus. p. 21-34.

Luginbuhl, H. and D. K. Detweiler. Animal models for the study of cerebrovascular disease. p. 35-44.

PART II UNIQUELY USEFUL ANIMAL TYPES

Benirschke, K. Why armadillos? p. 45-54.

Metcalfe, J., A. S. Hoversland, L. F. Erickson, A. L. Rogers and P. L. Clary. The pygmy goat as an experimental animal. p. 55-63.

Clarkson, T. B., B. C. Bullock, N. D. M. Lehner, and M. A. Feldner. The squirrel monkey as a laboratory animal. p. 64-87.

Barnes, R. D. Marmosa mitis, a small marsupial for experimental biology. p. 88-100.

PART III THE SEARCH FOR ANIMAL MODELS

Jobe, C. L. Selection and development of animal models of myocardial infarction. p. 101-108.

Lerner, R. A. and F. J. Dixon. Experimental and human glomerulonephritis associated with anti-glomerular basement-membrane antibodies. p. 109-130.

Patterson, D. F. Animal models of congenital heart disease (with special reference to patent ductus arteriosus in the dog). p. 131-156.

Prichard, R. W. Some human diseases for which animal models are needed. p. 157-167.

Animal models for biomedical research II. 1969.
NAS, Washington, D.C. ISBN 0-309-01736. 53 p.,
paper 2.75. Held in Boston, July 22, 1968,
cosponsored by ACLAM.

Bodgen, A. E. Immunologic reactions in
transplantation. p. 1-10.

Holmes, A. W., J. D. Ogden, and F. Deinhardt.
Marmosets in microbiological research. p. 11-17.

Brewer, W. E. Aquatic animals as indicators of
toxic materials in an ecosystem. p. 18-25.

LeMunyan, C. D. Selection of the appropriate
biological model for research in environmental
health. p. 26-31.

Aust, J. B. Animal models for tissue and organ
transplantation. p. 32-37.

Tyler, W. S. and J. R. Gillespie. Structural
and functional alterations in horses with
emphysema. p. 38-52.

Animal models for biomedical research III. 1970.
NAS, Washington, D.C. ISBN 0-309-01854-4. 148 p.,
paper \$4.95. Held in Minneapolis, July 14, 1969,
cosponsored by ACLAM.

Padgett, G. A., J. M. Holland, D. J. Prieur, W. D.
Davis, and J. R. Gorham. The Chediak-Higashi
Syndrome: A review of the disease in man, mink,
cattle, and mice. p. 1-12.

Cornelius, C. E. Hereditary hyperbilirubinemia
in sheep. p. 13-21.

Clarkson, T. B., R. W. Prichard, B. C. Bullock,
N. D. M. Lehner, H. B. Lofland, and R. W.
St. Clair. Animal models of atherosclerosis.
p. 22-41.

Muhrer, M. E. Animal models in hemophilia
research: A review. p. 42-51.

Kitchen, H., E. O. Kouba, and C. W. Easley.
Animal models for the study of hemoglobinopathies.
p. 52-70.

Lund, J. E. Cyclic neutropenia in man and dog.
p. 71-79.

Hegreberg, G. A., G. A. Padgett, and R. C. Page.
The Ehlers-Danlos Syndrome of dogs and mink.
p. 80-90.

Ader, R. Psychological factors in comparative
biomedical research. p. 91-102.

Nace, G. W. The use of amphibians in biomedical
research. p. 103-124.

Rall, D. P. Animal models for pharmacotherapeutic
studies. p. 125-132.

Hubbard, R. C. The use of marine mammals in
biomedical research. p. 133-146.

Animal models for biomedical research IV. 1970.
NAS, Washington, D.C. ISBN 0-309-019184. 162 p.,
paper, \$5.50. Held in Las Vegas, June 24, 1970,
cosponsored by ACLAM.

Van Hoosier, G. L., Jr. Comparative viral
oncology - rodents and man. p. 1-10.

Hardy, W. D., Jr. Feline lymphosarcoma: A
model of viral carcinogenesis and significance
related to human neoplasia. p. 11-26.

Klontz, G. W. Fish as biomedical research
models. p. 27-30.

Abinanti, F. R. Chronic and degenerative diseases
of man: The value of natural and experimentally
induced diseases of animals. p. 31-46.

Finch, C. E. Comparative biology of senescence:
Evolutionary and developmental considerations.
p. 47-67.

Upton, A. C. Vascular lesions associated with
aging in the mouse. p. 68-73.

Franklin, D., S. F. Vatner, and R. L. Van Citters.
Studies on peripheral vascular dynamics using
animal models. p. 74-84.

Morrison, P. Arctic and alpine rodent as models
for biomedical research. p. 85-91.

Smith, K. H. Application of animal models to
human undersea habitation. p. 92-109.

Yunis, E. J., O. Stutman, and R. A. Good. The
thymus and immune functions in animals and
man. p. 110-134.

Glenn, B. L. Feline porphyria: Comparative
aspects with porphyria of other domestic
animals and man. p. 135-148.

Swarm, R. L. Congenital hyperbilirubinemia in
the rat: An animal model for the study of
hyperbilirubinemia. p. 149-160.

OTHER PUBLICATIONS

A symposium on neoplasms and related disorders of
invertebrate and lower vertebrate animals. 1969.
C. J. Dawe, and J. C. Harshbarger (eds.). National
Cancer Institute Monograph 31. National Cancer
Institute, Bethesda, Maryland. 772 p. \$9.00.
(Available from the Superintendent of Documents,
U.S. Government Printing Office, Washington, D.C.
20402.)

This symposium, held at the Smithsonian
Institution, Washington, D.C., June 19-21, 1968,
was the first international meeting convened
specifically to consider tumors and tumorigenesis
in lower animals. The material discussed at the
symposium and presented in this publication suggests
the potential value of studies in lower animal
pathology to medical and environmental welfare.

FISHES, PREVERTEBRATES, AND ECHINODERMS

- Dawe, C. J. Phylogeny and oncogeny. p. 1-39.
- Goon, R. A., and J. Finstad. Essential relationship between the lymphoid system, immunity, and malignancy. p. 41-58.
- Wellings, S. R. Neoplasia and primitive vertebrate phylogeny: Echinoderms, p. 117-128.
- Andrew, W. Tumors and aging. p. 129-140.
- Halver, J. E., L. M. Ashley, and R. R. Smith. Aflatoxicosis in Coho salmon. p. 141-155.
- Ashley, L. M., J. E. Halver, and S. R. Wellings. Case reports of three teleost neoplasms. p. 157-165.
- Dunbar, C. E. Lymphosarcoma of possible thymic origin in salmonid fishes. p. 167-171.
- Cooper, R. C., and C. A. Keller. Epizootiology of papillomas in English sole Parophrys vetulus. p. 173-185.
- Deys, B. F. Papillomas in the Atlantic eel, Anguilla vulgaris. p. 187-193.
- Walker, R. Virus associated with epidermal hyperplasia in fish. p. 195-207.
- Walker, R. Epidermal hyperplasia in fish: Two types without visible virus. p. 209-213.
- Steeves, H. R., III. An epithelial papilloma of the brown bullhead, Ictalurus nebulosus. p. 215-217.
- Harshbarger, J. C., and G. W. Bane. Case report of a fibrolipoma in a rockfish, Sebastes diploproa. p. 219-221.
- Lopez, D. M., M. M. Sigel, A. R. Beasley, and L. S. Dietrich. Biochemical and morphologic studies of lymphocystis disease. p. 223-236.
- Sprague, V. Microsporidia and tumors, with particular reference to the lesion associated with Ichthyosporidium sp. Schwartz, 1963. p. 237-249.
- Smith, A. C., and H. F. Little. Liver lesions produced by hydatid-like cysts in an elasmobranch, the electric ray, Torpedo californica. p. 251-254.
- Fontaine, A. R. Pigmented tumor-like lesions in an ophiuroid echinoderm. p. 255-261.

INSECTS

- King, R. C. Hereditary ovarian tumors of Drosophila melanogaster. p. 323-345.
- Hadorn, E. Proliferation and dynamics of cell heredity in blastema cultures of Drosophila. p. 351-364.
- Gateff, E., and H. A. Schneiderman. Neoplasms in mutant and cultured wild-type tissues of Drosophila. p. 365-397.
- Sutherland, D. J. Nerve severance and tumor induction in Periplaneta americana (L.). p. 399-418.
- Taylor, R. L. Formation of tumor-like lesions in the cockroach Leucophaea maderae after decapitation. p. 419-432.
- Sutherland, D. J. Effects of certain carcinogens on Periplaneta americana (L.). p. 433-445.
- Baerwald, R. J., and G. M. Boush. Abnormal cellular responses in Periplaneta americana (L.) resulting from intracoelomic injections of benzo(a)pyrene. p. 447-451.
- Sutherland, D. J. Rectal tumefactions in the cockroach, Periplaneta americana (L.). p. 453-458.
- Hema, P., and K. K. Nayar. Possible ovarian influence on tumor development after nerve section in Periplaneta americana (L.). p. 459-463.
- Matz, G. Histology and transmission of Locusta migratoria (L.) tumors (Insecta Orthoptera). p. 465-473.
- Smirnoff, W. A. Formation of cysts as a defensive reaction in pupae and adults of Neodiprion swainei Midd. (Hymenoptera: Tenthredinidae). p. 475-479.
- Jones, J. C. Hemocytes and the problem of tumors in insects. p. 481-485.
- Mills, R. R. Effect of plant and insect hormones on the formation of the goldenrod gall. p. 487-491.
- Marambaesch, K., E. Shikata, H. Hirumi, and R. R. Granados. Multiplication and cytopathology of a plant tumor virus in insects. p. 493-507.

INVERTEBRATES OTHER THAN INSECTS AND ECHINODERMS

- Pauley, G. B. A critical review of neoplasia and tumor-like lesions in mollusks. p. 509-539.
- Farley, C. A. Probable neoplastic disease of the hematopoietic system in oysters, Crassostrea virginica and Crassostrea gigas. p. 541-555.
- Couch, J. A. An unusual lesion in the mantle of the American oyster, Crassostrea virginica. p. 557-562.
- Welf, P. H. Neoplastic growth in two Sydney rock oysters, Crassostrea commercialis (Iredale and Roughley). p. 563-573.
- Galstoff, P. S. Anomalies and malformations in

- the shells of Crassostrea virginica. p. 575-580.
- Schmeer, A. C. Mercenene: An antineoplastic agent extracted from the marine clam, Mercenaria mercenaria. p. 581-591.
- Hancock, R. L. Cytological and comparative biochemical studies on normal and neoplastic earthworm tissues. p. 593-643.
- Firminger, H. L., S. Antoine, and E. Adams. Epithelioma-like lesion in Lumbricus terrestris after cold injury. p. 645-653.
- Cooper, E. L. Neoplasia and transplantation immunity in annelids. p. 655-669.
- Sparks, A. K. Review of tumors and tumor-like conditions in protozoa, coelenterata, platyhelminthes, annelida, sipunculida, and arthropoda, excluding insects. p. 671-682.
- Foster, J. A. Malformations and lethal growths in planaria treated with carcinogens. p. 683-691.
- Mix, M. C. and A. K. Sparks. Histopathological effects of ionizing radiat on the planarian, Dugesia tigrina. p. 693-707.
- Lenhoff, H. M., C. Rutherford, and H. D. Heath. Anomalies of growth and form in hydra: Polarity, gradients, and a neoplasia analog. p. 709-737.
- Shostak, S., and R. V. Tammariello. Supernumerary heads in Hydra viridis. p. 739-750.
- Van Wagtenonk, W. J. Neoplastic equivalents of protozoa. p. 751-768.
- ***
- Symposium on comparative morphology of hematopoietic neoplasms. 1969. C. H. Lingeman and F. M. Garner (eds.). National Cancer Institute Monograph 32. 365 p. \$5.50. (Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.)
- This is the report of a symposium sponsored by the Armed Forces Institute of Pathology and the National Cancer Institute in Washington, D.C. on March 11 and 12, 1968. The monograph collates current knowledge and concepts about the hematopoietic neoplasms developed in three different areas of research. As knowledge has increased about neoplasms in domestic animals, laboratory animals, and man, three separate emphases, with three quite different vocabularies have emerged. Synthesis of investigative results from the three fields is necessary and imminent. This monograph is designed to serve as a single convenient reference source for pathological information from the areas in question. It is hoped that the reports as well as the conference that generated them, will effect communication between the various pathologists studying veterinary, laboratory, and human leukemias and lymphomas.
- Stewart, H. L. Perspectives in comparative oncology. p. 1-5.
- Dawe, C. J. Neoplasms of blood cell origin in poikilothermic animals - a review. p. 7-28.
- Heimboldt, C. F., and T. N. Fredrickson. The avian leukosis complex. p. 29-42.
- Dunn, T. B. Comparative aspects of hematopoietic neoplasms of rodents. p. 43-47.
- McIntire, K. R. Reticular neoplasms of SJL/J mice. p. 49-58.
- Snell, K. C. Hematopoietic neoplasms of rats and mastomys. p. 59-63.
- Opler, S. R. Morphology of avian leukemia. p. 65-72.
- Nielsen, S. W. Spontaneous hematopoietic neoplasms of the domestic cat. p. 73-94.
- Jones, T. C. Chromosomal analyses of feline lymphomas. p. 95.
- Squire, R. A. Spontaneous hematopoietic tumors of dogs. p. 97-116.
- Whang-Peng, J. Chromosome studies in various neoplasms of domestic animals. p. 117-151.
- Garner, F. M., and L. W. Schwartz. Spontaneous hematopoietic neoplasms of free-living and captive wild mammals. p. 153-156.
- Lingeman, C. H., R. E. Reed, and F. M. Garner. Spontaneous hematopoietic neoplasms of non-human primates. Review, case report, and comparative studies. p. 157-170.
- Cotchin, E. Comparative aspects of hematopoietic neoplasms of animals - summary. p. 171-176.
- Squire, R. A. Non-neoplastic hyperplasias of lymph nodes of animals. p. 257-266.
- Dunn, T. B. Mast cell neoplasms of mice. p. 285-287.
- Lingeman, C. H. Comparative aspects of the mastocytoses. p. 289-295.
- Squire, R. A. Burkitt's lymphoma - a comparative study. p. 297-301.
- Lingeman, C. H. Plasma cell neoplasms of man and animals. p. 303-314.
- Stookey, J. L. Transmissible venereal tumors of dogs. p. 315-320.
- Howard, E. B., and S. W. Nielsen. Cutaneous histiocytomas of dogs. p. 321-328.
- McConnell, E. E. Yaba virus tumors. p. 329-334.
- Banfield, W. G. Hamster lymphoma, TM. p. 335-336.
- Leader, R. W. The Chediak-Higashi anomaly - an evolutionary concept of disease. p. 337-339.
- Anderson, L. J., W. F. H. Jarrett, and G. W. Crighton. A classification of lymphoid neoplasms of domestic mammals. p. 343-353.

Rappaport, H. Comparative aspects of hematopoietic neoplasms of man and animals - summary. p. 359-361.

Squire, R. A. Comparative aspects of hematopoietic neoplasms of animals and man - summary. p. 363-365.

Les mutants pathologiques chez l'animal. Leur intérêt dans la recherche bio-médicale. Orléans-la-Source, 2-3 April 1969. 1970. M. Sabourdy (ed.). Editions du Centre National de la Recherche Scientifique, Paris.

One of the aims of this symposium was to inform French research workers concerning a variety of pathological mutants in order to promote their use. Animal species are subject to an array of inherited diseases that represent spontaneous models of conditions that sometimes cannot be artificially reproduced. These models are particularly useful in biomedical research. Mutants make possible a number of investigations in developmental biology, comparative pathology, and inborn errors of metabolism. The volume includes 25 reports, as listed below, as well as the discussions that follow each presentation.

Farkas, E., J. P. Zahnd, J. L. Nussbaum, and P. Mandel. Etude histologique, histochimique et ultrastructurale des souris de souche "Jimmy." p. 21-27.

Bonaventure, N. *Addendum.* Données électrophysiologiques obtenues au niveau du système nerveux chez la souris Jimmy "Jp." p. 29-31.

Nussbaum, J. L., N. M. Neskovic, and D. M. Kostic. Modifications portant sur les lipides du cerveau chez la souris de souche "Jimmy." p. 33-55.

Kurihara, T., and P. Mandel. 2', 3'-cyclic nucleotide 3'-phosphohydrolase: A new marker of myelin confirmed by the study of the mutant mice with deficient myelination p. 57-67.

Sidman, R. L., and M. C. Green. "Nervous," a new mutant mouse with cerebellar disease. p. 69-79.

Baumann, N., C. Jacque, and M. L. Harpin. Anomalies des lipides cérébraux chez la souris "Quaking." p. 81-89.

Berger, B. Quelques aspects histopathologiques du système nerveux chez la souris "Quaking." Données ultrastructurales. p. 91-98.

Pollet, S., J. M. Bourre, and N. Baumann. Etude de la biosynthèse "de novo" des acides gras dans le cerveau de souris normales, "Quaking" et hétérozygotes pour le caractère "Quaking." p. 99-109.

Sarli, P., and N. Bonaventure. La mutation rd (retinal degeneration) chez la souris: Aspects histo- et physiopathologiques. p. 111-132.

Dulin, W. E., A. Y. Chang, and G. C. Gerritsen. Spontaneous diabetes in the Chinese hamster. p. 133-153.

Westman, S. The obese-hyperglycemic syndrome in mice (obob). p. 155-178.

Malaisse, W., and F. Malaisse-Lagae. Vue d'ensemble sur la diabétogénèse des rongeurs de laboratoire. p. 179-187.

Falconer, D. S. Genetics of diabetes in mice. p. 189-195.

Halpern, B., and A. Fray. Le syndrome autoimmun de la souris NZB et modification de son cours par le *Corynebacterium parvum*. p. 197-213

Stiffel, C., D. Mouton, and G. Biozzi. Activité fonctionnelle du système réticulo-endothélial chez les souris affectées d'obésité génétique. p. 215-233.

Ashmore, C. R. Some aspects of oxidative metabolism in muscle of chickens with hereditary muscular dystrophy. p. 225-238.

Watts, D. C. A comparative study of the creatine kinase from mouse, rabbit, man and monkey. p. 239-251.

Schapira, F., and J. C. Dreyfus. Types embryonnaires des isozymes de l'aldolase chez le poulet atteint de dystrophie musculaire héréditaire. p. 253-264.

Delain, D., J. C. Dreyfus, F. Schapira, and G. Schapira. Formes moléculaires de plusieurs enzymes en culture de muscle d'embryon de poulet normal et dystrophique. p. 265-272.

Gruneberg, H. Skeletal mutants in mammals. p. 273-278.

Deol, M. S. Mouse mutants with inner ear defects and their value in biomedical research. p. 279-292.

Housset, E., J. P. Etienne, J. P. Petite, and B. Christoforov. Intérêt expérimental du rat Gunn. p. 293-315.

Dodds, W. J. Congenital thrombopathies and related coagulation disorders in dogs. p. 317-326.

Larrieu, M. J., and D. Meyer. Les mutants pathologiques chez l'animal avec déficit en facteur VIII. p. 327-341.

Lauvergne, J. J. A propos d'un gène autosomal dominant pour l'absence de cornes capable d'induire l'inter-sexualité des femelles et la stérilité des mâles, chez la chèvre domestique. p. 343-348.

Champigny, O. Quelques aspects de la mutation "atrichis" chez le rat WAG. p. 349-352.

Second Brook Lodge workshop on spontaneous diabetes in laboratory animals. 1970. A. E. Renold, G. F. Cahill, Jr., and G. C. Gerritsen (eds.). Diabetologia 6(3):153-370.

This publication is a collection of papers

from the Second Brook Lodge Workshop on Spontaneous Diabetes in Laboratory Animals held at Brook Lodge, Augusta, Michigan, November 6-8, 1969. Three years had gone by since the first Brook Lodge Workshop was held and published (*Diabetologia* 3: 63-286, 1967). Publication of the first Workshop served to define and consider the types of "inherited diabetes," and to explain why it seemed eminently appropriate to a number of investigators to obtain a fresh view of the problem of diabetes mellitus by making use of the occurrence, in small laboratory animals, of syndromes that exhibit many of the features of human diabetes. One of the main ends served by the first Workshop was that of establishing a common nomenclature acceptable to all participants, representing a majority of the laboratories then working in the field of animal "diabetes." (The second Workshop is a progress report, demonstrating quite clearly the areas where considerable progress has been made, and others where new information had not been forthcoming during the intervening three years.)

Schmidt, F. L., L. G. Leslie, J. R. Schultz, and G. C. Gerritsen. Epidemiological studies of the Chinese hamster. p. 154-157.

Gerritsen, G. C., L. B. Needham, F. L. Schmidt, and W. E. Dulin. Studies on the prediction and development of diabetes in offspring of diabetic Chinese hamsters. p. 158-162.

Butler, L., and G. C. Gerritsen. A comparison of the modes of inheritance of diabetes in the Chinese hamster and the KK mouse. p. 163-167.

Carpenter, A. M., G. C. Gerritsen, W. E. Dulin, and A. Lazarow. Islet and Beta cell volumes in offspring of severely diabetic (ketotic) Chinese hamsters. p. 168-176.

Gerritsen, G. C., and M. C. Blanks. Preliminary studies on food and water consumption of prediabetic Chinese hamsters. p. 177-179.

Chang, A. Y., and D. I. Schneider. Metabolic abnormalities in the pancreatic islets and livers of the diabetic Chinese hamster. p. 180-185.

Federman, J. L., and G. C. Gerritsen. The retinal vasculature of the Chinese hamster. A preliminary study. p. 186-191.

Luse, S. A., G. C. Gerritsen, and W. E. Dulin. Cerebral abnormalities in diabetes mellitus: An ultrastructural study of the brain in early onset diabetes mellitus in the Chinese hamster. p. 192-198.

Orci, L., W. Stauffacher, W. E. Dulin, A. E. Renold, and Ch. Rouiller. Ultrastructural changes in A-cells exposed to diabetic hyperglycemia. Observations made on pancreas of Chinese hamsters. p. 199-206.

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Chick, W. L., and A. A. Like. Studies in the diabetic mutant mouse: III. Physiological factors associated with alterations in Beta cell proliferation. p. 243-251.

Chick, W. L., and A. A. Like. Studies in the diabetic mutant mouse: IV DBM, a modified diabetic mutant produced by out-crossing of the original strain. p. 252-256.

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Coleman, D. L., and K. P. Hummel. The effects of hypothalamic lesions in genetically diabetic mice. p. 263-267.

Wyse, B. M., and W. E. Dulin. The influence of age and dietary conditions on diabetes in the db mouse. p. 268-273.

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Westman, S. Pathogenetic aspects of the obese-hyperglycemic syndrome in mice (genotype obob): I. Function of the pancreatic B-cells. p. 279-283.

Hellerstrom, C., S. Westman, G. Herbai, B. Pettersson, J. Westman, E. Borglund, and C.-G. Ostensson. Pathogenetic aspects of the obese-hyperglycemic syndrome in mice (genotype obob): II. Extrapankreatic factors. p. 284-291.

Herberg, L. E., E. Major, U. Hennigs, D. Gruneklee, G. Freytag, and F. A. Gries. Differences in the development of the obese-hyperglycemic syndrome in obob and NZO mice. p. 292-299.

Herberg, L., F. A. Gries, and Ch. Hesse-Wortmann. Effect of weight and cell size on hormone-induced lipolysis in New Zealand obese mice and American obese hyperglycemic mice. p. 300-305.

Strautz, R. L. Studies of hereditary-obese mice (obob) after implantation of pancreatic islets in milipore filter capsules. p. 306-312.

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Dulin, W. E., and B. M. Wyse. Diabetes in the KK mouse. p. 317-323.

Camerini-Davalos, R. A., W. Oppermann, R. Mittl, and T. Ehrenreich. Studies of vascular and other lesions in KK mice. p. 324-329.

Stauffacher, W., L. Orci, M. Amherdt, I. M. Burr, L. Balant, E. R. Froesch, and A. E. Renold. Metabolic state, pancreatic insulin content and B-cell morphology of normoglycemic spiny mice (*Acomys cahirinus*): Indications for an impairment of insulin secretion. p. 330-342.

Orci, L., W. Stauffacher, M. Amherdt, R. Pictet, A. E. Renold, and Ch. Rouiller. The kidney of

spiny mice (*Acomys cahirinus*): Electron microscopy of glomerular changes associated with aging and tubular glycogen accumulation during hyperglycemia. p. 343-355.

Creutzfeldt, W., D. Mende, B. Willms, and H. D. Soling. Vascular basement membrane thickness in muscle of spiny mice and activities of glycolysis and gluconeogenesis in the liver of animals with spontaneous and experimental diabetes and of untreated human diabetics. p. 356-360.

Ming, P. M. L., and J. Whang-Peng. Cytogenetic studies of the somatic and germ-line cells in sand rats (*Psammomys obesus*). p. 361-365.

Brodoff, B. N., and G. Zeballos. Further studies on the effect of hypothalamic lesions in the sand rat (*Psammomys obesus*). p. 366-370.

Medical primatology 1970. 1971. Selected papers from the Second Conference on Experimental Medicine and Surgery in Primates, New York, New York, September 1969. E. I. Goldsmith and J. Moor-Jankowski (eds.). S. Karger, Basel, Switzerland. 998 p. \$67.20.

This collection of over 100 papers is an outgrowth of the Second Conference on Experimental Medicine and Surgery in Primates held in New York in September 1969. It is not a proceedings volume in the usual sense, in that the papers were reviewed and edited on the basis of their contribution to the total concept of the publication. It was the editors' intention that the volume describe the nature of medical primatology at this time. The Conference from which this book originated emphasized the results of medical research using nonhuman primates as experimental animals and the improvements in husbandry and methods of handling primates. The sections covered in this volume include: Man and Nonhuman Primates; Immunological Response; Cross-circulation between Man and Simians; Experimental Transplantation in Primate Animals; Comparative Biology, Genetics and Phylogenetics; The Nervous System, Man and Nonhuman Primates; The Nervous System, Perinatal Biology and Development; Behavioral Physiology; Reproduction, Perinatal Development Studies; Virology; Infectious Diseases; and Reports from Major Primate Laboratories and Current Programs. Papers of particular interest with regard to the Animal Models and Genetic Stocks Program are cited below.

Brede, H. D., G. P. Murphy, H. W. Weber, J. J. W. Van Zyl, J. N. De Klerk, and E. R. Rudman. The baboon as a model for the evaluation of ALS/ALG for use in human patients. p. 44-49.

Shulman, L. B. Experimental allogeneic tooth transplantation in primates. p. 176-187.

Kalter, S. S. and R. L. Heberling. Comparative virology of primates. p. 272-280.

Buxton, D. F. Comparative neuroanatomy of primates. p. 300-303.

Young, F. A., and D. N. Farrer. Visual similarities of nonhuman and human primates. p. 316-328.

Heberling, R. L., and S. S. Kalter. Recent developments in nonhuman primate virology. A review. p. 648-659.

Wolfe, L. G., B. Marczyńska, H. Rabin, R. Smith, P. Tischendorf, F. Gavitt, and F. Deinhardt. Viral oncogenesis in nonhuman primates. p. 671-682.

Taranta, A., G. Goldstein, M. Spagnuolo, M. Davidson, and J. W. Uhr. Experimental streptococcal infections in nonhuman primates. p. 748-760.

Beller, F. K. Physiopathology of endotoxemia. Primate animal as a prospective subject for study. p. 766-771.

Orihel, T. C. Primates as models for parasitological research. p. 772-782.

Fraser, C. E. O., and S. F. Doll. Experimental trachoma in owl monkey and Taiwan monkeys. p. 783-791.

Schrier, A. M., M. L. Povar, and J. Vaughan. Primates in eye movement research. p. 847-858.

Levy, B. M., S. Dreizen, J. K. Hampton, Jr., A. C. Taylor, and S. H. Hampton. Primates in dental research. p. 859-869.

Lehner, N. D. M., T. B. Clarkson, B. C. Bullock, H. B. Lofland, R. W. St. Clair, and R. W. Prichard. Studies on atherosclerosis of some nonhuman primates. p. 873-885.

Kinard, R. A program for inoculation of primates with potentially oncogenic viruses. p. 895-902.

Voss, W. R. The care of baboons used in human leukemia and oncogenic virus studies. p. 903-911.

Deinhardt, F. Use of marmosets in biomedical research. p. 918-925.

Morphology of experimental respiratory carcinogenesis. 1970. P. Nettesheim, M. G. Hanna, Jr., and J. W. Deatherage, Jr. (eds.). U. S. Atomic Energy Commission, Division of Technical Information, Oak Ridge, Tennessee. 483 p. \$6.00. (Available as CONF-700501 from the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22151.)

The Conference on the Morphology of Experimental Respiratory Carcinogenesis was held in Gatlinburg, Tennessee, May 13-16, 1970. This volume represents the proceedings of that conference, which dealt specifically with the morphological characteristics of tumors in the respiratory tract of common laboratory and domestic animals, and their induction by various carcinogens and methods of exposure. The volume includes 27 papers, as listed below, as well as the discussions that follow each presentation.

- Sorokin, S. P. The cells of the lungs. p. 3-44.
- Shorter, R. G. Cell kinetics of respiratory tissues, both normal and stimulated. p. 45-62.
- Saccomanno, G., R. P. Saunders, V. E. Archer, O. Auerbach, and L. Brennan. Metaplasia to neoplasia. p. 63-82.
- Anderson, W. A. D. Classification of human lung tumors. p. 83-92.
- Berg, J. W. Epidemiology of the different histologic types of lung cancer. p. 93-104.
- Churg, J., and M. Kannerstein. Occupational exposure and its relation to type of lung cancer. p. 105-120.
- Nielsen, S. W. Pulmonary neoplasia in domestic animals. p. 123-146.
- Howard, E. B. The morphology of experimental lung tumors in beagle dogs. p. 147-160.
- Stewart, H. L., T. B. Dunn, and K. C. Snell. Pathology of tumors and nonneoplastic proliferative lesions of the lungs of mice. p. 161-184.
- Brooks, R. E. Ultrastructure of mouse pulmonary adenomas. p. 185-202.
- Kuschner, M., and S. Laskin. Pulmonary epithelial tumors and tumor-like proliferation in the rat. p. 203-226.
- Shabad, L. M., and L. N. Pylev. Morphological lesions in rat lungs induced by polycyclic hydrocarbons. p. 227-242.
- Saffiotti, U. Morphology of respiratory tumors induced in Syrian golden hamster. p. 245-254.
- Mohr, U. Effects of diethylnitrosamine in the respiratory system of Syrian golden hamster. p. 255-266.
- Hoch-Ligeti, C., and M. F. Argus. Effects of carcinogens on the lung of guinea pigs. p. 267-280.
- Rigdon, R. H. Lung tumors in the white Pekin duck. p. 281-297.
- Smith, W. E., L. Miller, and J. Churg. An experimental model for study of carcinogenesis in the respiratory tract. p. 299-316.
- Crocker, T. T., J. E. Chase, S. A. Wells, and L. L. Nunes. Preliminary report on experimental squamous carcinoma of the lung in hamsters and in a primate (*Galago crassicaudatus*). p. 317-328.
- Leuchtenberger, C., and R. Leuchtenberger. Effects of chronic inhalation of whole fresh cigarette smoke and of its gas phase on pulmonary tumorigenesis in Snell's mice. p. 329-346.
- Wagner, J. C. The pathogenesis of tumors following the intrapleural infection of asbestos and silica. p. 347-358.
- Althoff, J., and R. B. Wilson. Morphological changes in the respiratory system of Syrian golden hamsters after treatment with dibutylnitrosamine. p. 359-364.
- Richter, C. B. Application of infectious agents to the study of lung cancer: Studies on the etiology and morphogenesis of metaplastic lung lesions in mice. p. 365-382.
- Little, J. B., B. N. Grossman, and W. F. O'Toole. Respiratory carcinogenesis in hamsters induced by polonium-210 alpha radiation and benzo(a)pyrene. p. 383-394.
- McClellan, R. O., J. E. Barnes, B. B. Boecker, T. L. Chiffelle, C. H. Hobbs, R. K. Jones, J. L. Mauderly, J. A. Pickrell, and H. C. Redman. Toxicity of beta-emitting radionuclides inhaled in fused clay particles - an experimental approach. p. 395-416.
- Park, J. F., E. B. Howard, B. O. Stuart, A. P. Wehner, and J. V. Dilley. Cocarcinogenic studies in pulmonary carcinogenesis. p. 417-436.
- Nettesheim, P., M. G. Hanna, Jr., D. G. Doherty, R. F. Newell, and A. Hellman. Effect of chronic exposure to air pollutants on the respiratory tracts of mice: Histopathological findings. p. 437-448.
- Dunn, T., M. Kuschner, U. Mohr, P. Nettesheim, M. Stanton, and V. Turusov. Panel discussion: Recommendations for classification of lung tumors in animals. p. 451-472.

Peptic ulcer. 1971. C. J. Pfeiffer (ed.). J. B. Lippincott Company, Philadelphia and Toronto. 366 p. \$24.00.

This monograph was stimulated by, and is partly based on, an international working conference on experimental ulcer that was held in conjunction with the Fourth World Congress of Gastroenterology in Copenhagen, Denmark, July 1970. This conference brought together approximately 50 leading medical scientists, representing 19 nations, concerned with research in peptic ulcer. This interdisciplinary group was comprised of gastroenterologists, physiologists, pharmacologists, pathologists, and surgeons. The present monograph contains the contributions of many of the participants of the Conference, as well as those of many experts in the field of peptic ulcer research who were unable to participate in the Copenhagen gathering. The purpose of the book is to convey to the medical scientific community at large current reviews and experimental findings relating to the ulcer problem and to record some of the transactions of the working conference. The monograph is intended for those in many disciplines, including medicine and gastroenterology, physiology, pharmacology, pathology, and psychology. The book contains many reviews with extensive bibliographies and many new and previously unpublished experimental findings in peptic ulcer research. It is hoped that the international working conference and the monograph will contribute to progress in understanding peptic ulcer.

PART I RECENT ADVANCES IN EXPERIMENTAL
DUODENAL AND GASTRODUDENAL ULCER

- Seronde, J., Jr. The Zucker ulcer: The duodenal ulcer of pantothenate deficiency. p. 3-12.
- Okabe, S., and C. J. Pfeiffer. The acetic acid ulcer model - A procedure for chronic duodenal or gastric ulcer. p. 13-20.
- Robert, A. Duodenal ulcers in the rat: Production and prevention. p. 21-33.
- Eagleton, G. B., and J. Watt. The selective production of gastric and duodenal ulceration using histamine. p. 34-44.
- Doteuchi, M. Gastrointestinal ulcers. Produced by reserpine and stress. p. 45-64.
- Wynn-Williams, A. Peptic ulcer in the NZB mouse. p. 65-68.

PART II METHODS FOR ACUTE AND CHRONIC
GASTRIC ULCERS

- Brodie, D. A. Stress ulcer as an experimental model of peptic ulcer disease. p. 71-83.
- Pfeiffer, C. J. Cold immersion, restraint stress - An ulcer model in the mouse for rapid, massive screening. p. 84-91.
- Levine, R. J. A method for the rapid production of stress ulcers in rats. p. 92-97.
- Singh, G. B. Restraint stress ulceration and the volume of gastric secretion in the rat. p. 98-104.
- Dubrasquet, M., D. Sergent, M. Lewin, and S. Bonfils. Relationship between circadian rhythms, spontaneous activity, and restraint ulcer in the rat. p. 105-112.
- Wilson, T. R. Monthly variations in the severity of experimental stress ulcers in rats. p. 113-117.
- Umehara, S., H. Ito, T. Tabayashi, A. Ishii, H. Kawasaki, K. Imai, and H. Hori. Studies on an experimental chronic gastric ulcer induced by the clamping-cortisone method in rats. p. 118-137.
- Skoryna, S. C., F. S. Fam, and S. Kahn. Experience with production of experimental gastric ulcers by local thermal injury. p. 138-142.

PART III MUCO-SUBSTANCES AND BIOCHEMICAL
ASPECTS OF EXPERIMENTAL ULCER

- Lambert, R., R. Truchot, C. Andre, and J. A. Chayvialle. A histological study of glycoproteins in the gastric mucosa of restrained rats. p. 145-154.
- De Graef, J. Physiology and physiopathology of sulfated glycoproteins and sulfated polysaccharide secretion by the gastric mucosa in the dog. p. 155-161.
- Willems, G., J. P. Barroy, and A. Gerard. Effects of cortisone and phenylbutazone on the gastroduodenal mucosa in dogs. A histochemical study

of carbohydrate-rich components. p. 162-170.

- Mozsik, G., T. Javor, M. Hauck, and T. Karsai. On some cellular mechanisms of ulcer development in pylorus-ligated rats. p. 171-184.
- Dascalakis, T. B. The allergic theory of experimental ulcers induced by phenylbutazone. A review of personal experimental studies. p. 185-189.
- Schwartz, J. C. Gastric histamine in the pathogenesis of experimental ulcer. p. 190-198.
- Abdel-Galil, A. A. M. Effect of parabiosis on phenylbutazone ulcerations in adrenalectomized rats. p. 199-203.

PART IV VASCULAR AND ANATOMIC
CONSIDERATIONS IN PEPTIC ULCER

- Pfeiffer, C. J., and S. Sethbhakdi. Vascular impairment. An etiologic factor in peptic ulcer? p. 207-220.
- Guth, P. The role of the microcirculation and the mast cell in stress ulcer. p. 221-236.
- Rasanen, T. The role of the mucosal mast cells in gastric ulceration. p. 237-243.
- Oi, M., T. Toriumi, O. Miho, and M. Kijima. Location of experimental ulcers as compared with that of human peptic ulcer. p. 244-259.
- Stephens, R. J., and C. J. Pfeiffer. Direct innervation of capillary endothelial cells in the lamina propria of the ferret stomach. p. 260-263.

PART V EXTRA-GASTRIC FACTORS IN
EXPERIMENTAL GASTRIC ULCERS

- Gheorghiu, T., H. J. Klein, H. Frotz, and G. Hubner. Pathogenesis of gastric ulcer in rats with carbon tetrachloride-induced liver damage. p. 267-287.
- Guerrin, F., J. P. Latreille, and B. Gosselin. Gastric effects of experimental portal hypertension. p. 288-295.
- Richman, S. Psychological aspects of experimental peptic ulcer. A review. p. 296-306.
- Anichkov, S. V., I. S. Zavodskaya, E. V. Moreva, and V. V. Korhov. Effect of dioxypheylalanine (DOPA) upon development of experimental neurogenic gastric ulcers. p. 307-311.
- Sanyal, A. K., P. K. Debnath, S. K. Bhattacharya, and K. D. Gode. The effect of cyproheptadine on gastric activity. An experimental study. p. 312-318.

PART VI CLINICAL AND PHARMACEUTICAL
PERSPECTIVES

- Roth, J. L. A. Clinical perspectives of experimental ulcer. p. 321-322.
- Mozsik, G., L. Nagy, F. Tarnok, and T. Javor. Examination of the cholinergic nervous transmission processes in cells of tissues around the gastric ulcer in patients. A molecular-pharmacologic study. p. 323-328.

Lee, Y. H., and R. G. Bianchi. Use of experimental peptic ulcer models for drug screening. p. 329-348.

Wilson, T. R. Gastric and intestinal ulceration produced by potassium supplements in rats: Differential effect of formulation and ionic composition. p. 349-353.

Summary of proceedings: Conference on breast cancer in animals and man. 1971. Texas Rep. Biol. Med. 29(3):349-374.

This report is the summary of the proceedings of a conference on breast cancer in animals and man held at the 10th International Cancer Congress in Houston, Texas, in May 1970. Participants in the conference included scientists from the United States, Japan, India, and Europe who discussed new developments in studies on human breast cancer and contributed to the exchange of recent information on breast cancer in animals and man. The article summarized each of the papers listed below.

Session 1

Hall, W. T. "Parturient montes nascitur ridiculus mus," or Experiments that came out, but not as expected. p. 353-357.

Bentvelzen, P. Parallels in viral, chemical, and "spontaneous" carcinogenesis of the mouse mammary gland. p. 354-355.

Lasfargues, E. Cell hybridization and MTV. p. 355-356.

Lavrin, D. Investigation of the $C^{3}Hf/Bi$ (Zb) strain for the absence of NIV and attempts to infect it with NIV. p. 356.

Session 2

Liebelt, A. G. Hyperplastic nodules and breast cancer in several strains of inbred mice of the Kirschbaum Memorial Laboratory. p. 357.

Medina, D. Some preliminary observations on cell culture of pre-neoplastic mouse mammary gland. p. 357-358.

Muhlbock, O. Genetics of the susceptibility of the mouse mammary gland to MTV. p. 358.

Nandi, S. Differences between M-MTV and R-MTV. p. 358-359.

Session 3

Ranadive, K. J. Highlights of observations of the inbred ICRC mouse susceptible to spontaneous breast cancer and leukemia. p. 359.

Slemmer, G. Pre-malignant mammary tissue of mice: Antigenicity, cellular composition, and progression to malignancy. p. 359-360.

Vlahakis, G. High incidence of mammary gland tumors in $C^{3}H-Av/yfb$ female mice not associated with a maternally transmitted MTV. p. 360.

Hilgers, J. Mouse antibodies to MTV. p. 360.

Sibal, L. Methods for the detection of MTV antigens. p. 360-361.

Session 4

Heppner, G. H. Attempts at selective manipulation of humoral and cellular immunity to mouse mammary tumors. p. 361.

Opler, S. R. Cell-mediated immune mechanisms in breast cancer. p. 362.

Kramarsky, B. Quantitative correlation between membrane fluorescence and MTV production in vitro. p. 362.

Daams, J. H. Immunofluorescence in MTV-infected organs. p. 363.

Session 5

Charney, J. Factors affecting the immunodiffusion assay for MTV. p. 363.

Aldrich, C. Studies on virion antigens of the mouse mammary tumor virus. p. 363-364.

Williams, W. C. Mixed hemadsorption reaction with mouse mammary tumors. p. 364-365.

Kodama, T. Studies of mammary tumor virus by ferritin-labeled antibodies. p. 365.

Session 6

Heston, W. E. Inability to predict mammary tumorigenesis in strain A mice from presence of mammary tumor virus or antigen in the milk. p. 365-366.

Smith, G. Preliminary studies on the ultrastructural localization of MTV antigens in chronically infected cells with peroxidase-labeled antibody. p. 366.

Calafat, J. Differences between B particles from some mouse strains. p. 366-367.

Sarkar, N. H. Morphogenesis of mammary tumor virus. p. 367.

Session 7

Mouriquand, J. Tissue culture of mammary tumors of the PS strain mice: Ultrastructural study and bioassay. p. 367-368.

Bucciarelli, E. Virus particles in BALB/cF(RIII) and related mouse strains. p. 368.

Harada, H. Mammary tumors in high leukemia strains of mice. p. 368-369.

Hageman, P. Separation and properties of B and C particles. p. 369.

Dutcher, R. M. Studies on C type virus in mammary tumors of rats. p. 369.

Dmochowski, L. Studies on the relationship of leukemogenesis and mammary tumorigenesis. p. 370.

Session 8

Chopra, H. Studies on virus particles resembling oncogenic RNA viruses in a monkey mammary adenocarcinoma. p. 370.

Moore, D. H. Some aspects of the search for a human MTV. p. 371.

Seman, G. A study on viruses related to breast cancer and pleural effusion cells. p. 371-372.

Feller, W. F. An EM survey of human breast cancer materials: Milk, cancer biopsy tissue, primary tissue cells, and a continuous cell culture line. Summary of a six-year study. p. 372.

Priori, E. Studies on human breast cancers using the fixed immunofluorescence test. p. 373.

Development of the rodent as a model system of aging. 1972. D. C. Gibson (ed.). National Institute of Child Health and Human Development, NIH, DHEW Publication No. (NIH) 72-121. 92 p. 45¢. (Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.)

The materials in this publication have been drawn extensively from the presentations and remarks made January 9-11, 1970, at the New Orleans Conference on the Rodent as a Model System for Research in Aging. The most significant aspects of the conference are highlighted in selected summaries prepared by the participants. The information presented in the monograph serves partially to delineate the needs of the investigator in research on aging as they relate to the development of animal model systems; the environmental concerns that must be an integral part of long-term studies; and the genetic and statistical considerations that must be exercised in the selection and development of the animal model system in aging. The various papers characterize the needs of research on aging for the critical selection, care, and maintenance of animal model systems for research in the field and emphasize that research on aging is heavily dependent on the knowledgeable selection, development, and controlled rearing of animal model systems that survive to natural senescence.

SECTION I THE RODENT AS A MODEL SYSTEM OF AGING

Johnson, H. A. The relevance of the rodent as a model system of aging in man. p. 3-6.

Heston, W. E. The basis for selection and study of rodent model systems. p. 7-10.

SECTION II CARE, MAINTENANCE AND MONITORING OF THE LABORATORY RODENT IN CHRONIC STUDIES

Flynn, R. J. Development and maintenance of laboratory rodents to meet the needs of aging research. p. 13-17.

Brennan, P. C. Standards and procedures for the long term maintenance of microbial stability of the laboratory rodent. p. 19-22.

Walburg, H. E., Jr. Microbiological definition and relevant microbiological considerations in rearing, maintenance and care of the laboratory rodent for research in aging. p. 23-29.

SECTION III GENETICS AND LABORATORY RODENT MODEL SYSTEMS IN AGING RESEARCH

Russell, E. S. Genetic considerations in the selection of rodent species and strains in aging. p. 33-53.

Grahn, D. Data collection and genetic analysis in the selection and study of rodent model systems in aging. p. 55-65.

A handbook: Animal models of human disease. 1972. T. C. Jones, D. B. Hackel, and G. Migaki (eds.). Registry of Comparative Pathology, Armed Forces Institute of Pathology, Washington, D.C. 20305. 48 p. \$4.25. (Available from the Registry of Comparative Pathology.)

This looseleaf handbook contains 16 animal model studies originally printed in the Journal of American Pathology and the Comparative Pathology Bulletin during the past three years. Subsequent sets of animal model papers will be prepared for future inclusion in the handbook, continuing the collection of animal models for the comparative study of disease.

Cummings, J. F. and D. C. Haas. Idiopathic polyneuritis, Guillain-Barré syndrome (dog).

Cornelius, C. E. Congenital hyperbilirubinemia, Dubin-Johnson syndrome (Corriedale sheep).

Benirschke, K. and R. J. Low. Acute toxoplasmosis (wooly monkey, Lebothrix lagotricha).

Rowlands, D. T., Jr. Bacterial endocarditis (opposum, Didelphis virginiana).

Jones, T. C. Sex chromosome anomaly, Klinefelter's syndrome (male tortoiseshell cat).

Glenn, B. L. Porphyria: Erythropoietic and hepatic types (cat).

Edwards, J. A. and R. M. Bannerman. Inherited hypochromic anemias of rodents.

Cornelius, C. E. Congenital hyperbilirubinemia, Gilbert's syndrome (Southdown sheep).

Fletcher, T. F. and H. J. Kurtz. Globoid cell leukodystrophy (dog).

Stevens, L. C. Teratoma, embryonal carcinoma, teratocarcinoma (mice).

Zook, B. C. Lead poisoning (simian primates).

Brinkhous, K. M. and T. Gambill. Hemophilia A and B (dog).

Shenefelt, R. E. Gross congenital anomalies (several species).

Oppenheimer, E. H. and J. B. Brayton. Needed:

An animal model for cystic fibrosis.

Osburn, B. I. Hydranencephaly and porencephaly
(sheep).

Kitchen, H., R. E. Murray, and B. Y. Cockrell.
Spina bifida, sacral dysgenesis and myelocoele
(Manx cats).

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