Abstracts

Reports of Research

The Carcinogenicity of *p*-Monomethylaminoazobenzene in Various Diets and the Activity of this Dye Relative to *p*-Dimethylaminoazobenzene. MILLER, E. C., and BAUMANN, C. A. [Coll. of Agric., and McArdle Memorial Lab., Univ. of Wisconsin Med. Sch., Madison, Wis.] *Cancer Research,* **6**:289-295. 1946.

Thirteen groups of 12 to 15 adult Sprague-Dawley rats were fed 0.056% of *p*-monomethylaminoazobenzene or 0.060% of *p*-dimethylaminoazobenzene for 13 to 14 weeks. At this time the livers were examined by laparotomy, and the rats were then continued on the same diets without the dye. The animals were killed for a final tumor count at 22 weeks. Sixty to 87% of rats fed a synthetic diet containing corn oil and *p*-monomethylaminoazobenzene had hepatomas by 22 weeks, while only 30% of the rats fed hydrogenated coconut oil developed tumors by this time. Raising the riboflavin content of the ration from 2 to 10 mgm. per kgm. reduced the tumor incidence slightly; when 20 mgm. per kgm. were fed, only 1 of 14 rats had a hepatoma at 22 weeks. Rats receiving diets which contained 0.3% of guanidoacetic acid, 0.35% of nicotinamide, or 0.3 or 0.5% of choline with *p*-monomethylaminoazobenzene developed approximately the same number of neoplasms as the animals on the control diet, although the methyl acceptors caused a more severe gross cirrhosis than the control diet. The addition of choline minimized the cirrhosis. Analyses of the livers and blood from rats on each of these diets indicated that the methyl acceptors and donor did not alter greatly the levels of *p*-dimethylaminoazobenzene, *p*-monomethylaminoazobenzene, and *p*-aminoazobenzene in the tissues. No liver tumors or gross cirrhosis were found in rats fed 0.106% of *p*-aminoazobenzene with 0.3% of choline for 11 months. When *p*-dimethylaminoazobenzene and *p*-monomethylaminoazobenzene were fed *ad libitum,* the rats receiving the monomethyl compound developed more tumors than those on the dimethyl dye. However, when the two compounds were compared by the paired-feeding technic, the carcinogenic activities were equal.—Authors' abstract.

Increased Incidence of Tumors in Mice After Intravenous Injection of 9:10-Dimethyl-1:2-Benzanthracene. STAMER, S. [Univ. Inst. of Path. Anat., Copenhagen, Denmark] *Acta path. et microbiol. Scandinav.,* **21**:632-639. 1944.

The intravenous injection of an aqueous suspension (1/1000) of 9,10-dimethyl-1,2-benzanthracene once a week for 4 weeks, in a total dose of 2 mgm., was followed by leukemia in 11 and by ovarian cancer in 2 of 51 individuals of the Black mouse strain, while none of their litter-mate controls had neoplastic diseases. This strain is practically "tumor-free," only 1 of a thousand of the animals dying of leukemia. Of 51 Street strain female mice given the injections, 16 died of leukemia, 4 had mammary carcinoma, 5 had cancer of the lung, 3 had "adenoma, suspect of carcinoma" of the lung, and 1 had cancer of the ovary. Among 47 litter-mate controls the incidence of these diseases was 3, 1, 0, 3, and 0, respectively. The injections had no influence on the incidence of mammary cancer or leukemia in female mice of Little's dilute brown (Dlb) strain, or in male and female mice of the Furth strain Aka.—M. H. P.

Further Experimental Studies on Intravenous Injection of 9:10-Dimethyl-1:2-Benzanthracene in Mice (Tolerance, Excretion, Effect on Normal Blood Cells). STAMER, S. [Univ. Inst. for Path. Anat., Copenhagen, Denmark] *Acta path. et microbiol. Scandinav.,* **22**:65-72. 1945.

When a 2.5% aqueous suspension of 9,10-dimethyl-1,2-benzanthracene was injected intravenously in a dose of 4 mgm. on the first day after transplantation of leukemic lymph node suspension into mice of the Aka strain, the development of leukemia was retarded. If the dose was raised to 10 mgm. (2 mgm. on the first, second, third, seventh, and ninth days, respectively), none of the transplants took. The maximum tolerated intravenous dose of this preparation in mice of the Street strain weighing about 20 gm. was 10 mgm. (4 mgm. daily for 2 days, then 2 mgm.); the animals died if 12 mgm. were given (4 mgm. daily for 2 days, then 2 mgm. daily for 2 days). An intravenous injection of 5 mgm. into Street strain mice weighing about 30 gm. caused temporary leukopenia but not anemia; a few mice given 10 to 20 mgm. developed extreme leukopenia and died of enteritis. Excretion studies on male mice of the Dlb strain showed that the time required for excretion of all the hydrocarbon from the body (as indicated by measurement of ultraviolet fluorescence) increased as the size of the intravenous dose increased from 0.1 mgm. to 4.0 mgm. The experiments indicate that while leukemic cells can be killed completely by the hydrocarbon (*e.g.*, in the Aka mice receiving 10 mgm.), the normal white blood cells are more resistant, and may return to the normal number again after complete excretion of the compound, *i.e.*, in about 17 days.—M. H. P.

Deposition of Methylcholanthrene in Some Organs of the Rat. ESMARCH, O. [Aarhus Municipal Hosp., and Radium Centre for Jutland] *Acta path. et microbiol. Scandinav.,* **19**:79-99. 1942.

When 10 mgm. of methylcholanthrene crystals in gly-

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cerol were deposited in the subcutaneous tissue, mammary tissue, striated muscle, peritoneum, spleen, lung, or uterus of rats 6 to 8 weeks old, sarcomas only were produced. Both sarcomas and squamous cell epitheliomas appeared after deposition in the thyroid gland or kidney. Sarcomas, a carcinosarcoma, and a lymphoblastoma were produced by deposition in the liver. Intracerebral injection produced no tumors in the brain but sometimes led to subcutaneous sarcoma formation. The results were not affected by x-ray treatment of the animals before administration of the carcinogen.—M. H. P.

Accelerated Development of Spontaneous Leukemia and Mammary Carcinoma in Mice after Ingestion of Carcinogenic Hydrocarbon. ENGELBRETH-HOLM, J., and POULSEN, O. [Univ. Inst. of Path. Anat., Copenhagen, Denmark] *Acta path. et microbiol. Scandinav.*, **21**: 472-479. 1944.

In mice of the Street strain, the incidence of spontaneous leukemia is 1 to 2% among all the animals, and of mammary tumor, 25 to 30% among the females. The leukemia appears at the age of 10 to 12 months, and the mammary cancer is most frequent in pluriparae that are 14 to 23 months old. One hundred and seventy-five mice (males and females) from this strain were given 9,10-dimethyl-1,2-benzanthracene by stomach tube (2 to 3 mgm. total, in doses of 0.1 mgm. once or twice a week); 142 siblings were used as controls. The mortality was high among the treated animals. At the time the first case of leukosis appeared 68 treated mice were living; 15% of these developed leukosis by the end of 14 months, as compared to 3% in 102 controls. When the first mammary tumor appeared, 22 females were living, and 40% developed tumor by the end of the 14 month observation period, as compared with 7% in the 57 control females. The fundus of the stomach of nearly all the treated animals showed hyperplasia of the squamous epithelium and a tendency to papilloma formation in the mucous membrane; no gastric carcinomas occurred.—M. H. P.

Morphological and Biological Investigations on Benzpyrene Sarcoma in Albino Rats. EKER, R. [Norwegian Radium Hosp.] *Acta path. et microbiol. Scandinav.*, **22**: 1-33. 1945.

A comparative investigation was made of 3 series of benzpyrene tumors in albino rats from a strain that had been inbred for over 10 years. The observations were made up on 106 animals in which the tumor was produced by the subcutaneous injection of 4 mgm. of benzpyrene in 1% olive oil solution, 112 rats given 20 mgm., and 27 rats given 60 mgm. It was found that there was no significant deviation in frequency of the sarcoma types (polymorphous-cell, spindle-cell, mixed-cell, and small spindle-cell). The latent period was shorter for the smallest dosage than for the other two, and was not related to morphological factors or to the tumor growth rate. The tumor growth rate increased slightly with increasing dosage, and decreased within each series as the size of the tumors increased. The frequency of lymph node metastases increased with dosage. Lung metastases, on the whole rare, were somewhat more frequent for the highest dosage than for the other two.

The sarcomas that metastasized generally had a higher atypic value and a lower fiber content than those that did not. The cellular fibrosarcomas had most metastases, the fibrocellular next, and the fibrous forms had none. The frequency of metastases decreased with age of the animals, and was apparently unrelated to the latent period, growth rate, average weight, and duration of the tumors. No relation could be demonstrated between age and morphological factors, latent period, or growth rate.—M. H. P.

The Effects of 9:10-Dimethyl-1:2-Benzanthracene on Transplanted Tumours. STAMER, S. [Danish Anti-Cancer League's Cancer Research Lab., Copenhagen, Denmark] *Acta path. et microbiol. Scandinav.*, **18**:533-557. 1941.

9,10-Dimethyl-1,2-benzanthracene, if given intra-abdominally in toxic doses, inhibited the growth of Crocker sarcoma 180 in Street strain mice, but had no effect on transplanted mammary carcinoma in strain Dlb. In these experiments, the body weights of the control animals were kept about like those of the experimental animals by a reduction in food, in order to eliminate the effect of weight-loss *per se* caused in the experimental animals by the 9,10-dimethyl-1,2-benzanthracene. The literature on the inhibitory effect of carcinogenic hydrocarbons on malignant tumors is reviewed with 33 references.—M. H. P.

The Guinea-Pig as an Experimental Animal in Cancer Research. ESMARCH, O. [Aarhus Municipal Hosp., and Radium Centre for Jutland] *Acta path. et microbiol. Scandinav.*, **19**:100-107. 1942.

Sarcomas developed at the site of injection, within 13 to 21 months, in 3 of 10 guinea pigs that received a subcutaneous injection of 10 mgm. of crystalline methylcholanthrene moistened with glycerol. In 4 of 10 animals given the carcinogen by intraperitoneal deposition, sarcomas developed in the abdominal cavity after 13 to 18.5 months. One of the tumors was successfully transplanted to other guinea pigs, takes occurring in 3 of 10 animals in the first passage and in 7 of 20 in the second passage. The fact that takes were so few in the first passages is attributed to the lack of suitably inbred strains of guinea pigs for such experiments. It would be advantageous if the guinea pig could be used in cancer research, because of its size and immunologic applicabilities.—M. H. P.

The Reaction of Tarred Rabbits to the Myxoma Virus. AHLSTRÖM, C. G. [Path. Inst., Lund, Sweden] *Acta path. et microbiol. Scandinav.*, **17**:394-416. 1940.

In rabbits previously infected with fibroma virus, the intradermal inoculation of myxoma virus usually produces a local skin tumor only, which soon regresses. However, if these animals were given an intramuscular injection of tar before the myxoma virus, the myxoma lesions were larger, continued to grow for some time, and showed a delayed regression in those animals that recovered. The tar effect was seen only if an old, weakened myxoma virus was used. Tar had no influence on the course of myxoma in rabbits not previously infected with fibroma. Tar-treated animals showed no increased susceptibility to myxoma virus, and developed a solid immunity to

fibroma virus as rapidly as did nontarred controls.—M. H. P.

The Influence of "Mucin 1701 W" on Infection with Shope Fibroma and Vaccinia Viruses. CLEMMESEN, J., and ANDERSON, E. K. [State Serum Inst., Copenhagen, Denmark] *Acta path. et microbiol. Scandinav.*, **19**:173-183. 1942.

Granular mucin, prepared by the method of Henderson [*Brit. J. Exper. Path.*, **20**: 1. 1939], when added to the suspending medium of Shope fibroma virus, did not influence the spread of the virus upon intradermal inoculation into young rabbits, but did favor the spread of the virus and the proliferative response to it upon intraperitoneal inoculation, and also increased the local reaction to intradermal injection of either fibroma virus or vaccinia virus. The minimal intradermal dose of either virus necessary for a "take" was reduced by suspending the virus in mucin, or by giving the mucin intravenously.—M. H. P.

Über den Einfluss von Bleitrypanblau auf Teerkrebs bei weissen Mäusen. (Vorläufige Mitteilung). [The Influence of Lead-Trypan Blue on Tar Cancer in White Mice. (Preliminary Communication).] BURSELL, S. [Pharmacol. Inst., Kgl. Univ., Upsala, Sweden] *Acta path. et microbiol. Scandinav.*, **18**:1-19. 1941.

Subcutaneous injection of lead-trypan blue for at least 100 days, starting at the earliest appearance of tar cancers, inhibited metastasis to the regional lymph nodes in male, but not in female mice. The preparation used was that of Woodhouse [*Am. J. Cancer*, **27**: 285. 1936], containing 196.7 mgm. % of lead sulfate (corresponding to 134.4 mgm. % of metallic lead), in which the lead was partially adsorbed on gelatine. Macroscopic examination of the treated animals indicated that the chemical combination with lead destroyed the affinity of trypan blue for tumors.—M. H. P.

Hereditary Tumor-Like Takes in Transplantation of Leukosis in Mice. HOGREFFE, G. [Univ. Inst. of Human Genet., Copenhagen, Denmark] *Acta path. et microbiol. Scandinav.*, **21**:783-800. 1944.

In mice of the Aka strain, which has a very high incidence of spontaneous leukosis, the transplantation of leukotic tissue (lymph nodes, spleen, thymus, liver) from Aka mice with this disease led only to generalized leukosis. No takes occurred in mice of the B strain, which has a low incidence of spontaneous leukosis and which is characterized by pituitary insufficiency as manifested in recessive dwarfism. The animals of the cross Aka × B in the F_2 generation and of strains formed by inbreeding from this generation showed three types of responses: generalized leukosis, tumor formation in the retroperitoneum and mesentery, and generalized leukosis plus tumor formation. The distribution of the types of lesions in the different strains indicates that genetic factors in the hosts determine the outcome of transplantation.—M. H. P.

Mechanical Traumatism and Development of Tumors in Inbred Mouse Strains. ENGELBRETH-HOLM, J. [Univ. Inst. of Path. Anat., Copenhagen, Denmark] *Acta path. et microbiol. Scandinav.*, **21**:775-779. 1944.

Contusion of the lymph nodes in 44 mice of the Aka strain did not increase the incidence of spontaneous leukemia (approximately 60%) in these animals, nor lead to the development of lymphosarcoma at the site of injury. Contusion of the mammary tissue in 49 female mice of the Street strain did not increase the incidence of spontaneous mammary carcinoma (approximately 20%). Testicular tumors, which do not develop spontaneously in either the Aka or Street strain, likewise failed to develop when 46 animals of these strains were subjected to contusion of the testis.—M. H. P.

Induced Resistance in Inbred Homozygous Rats to a Lymphosarcoma Autogenous to the Strain. GOLDFEDER, A. [New York Univ. Coll. of Med. and Bellevue Hosp., and Dept. of Biol., New York Univ., New York, N. Y.] *Proc. Soc. Exper. Biol. & Med.*, **59**:104-109. 1945.

The present study is concerned with the production of resistance in an inbred strain of rats toward a tumor originating in that strain. The tumor employed was a reticulum cell type lymphosarcoma that takes in practically 100% of young rats and rarely regresses spontaneously. Ten to 12 day old tumors were removed under strict aseptic conditions. The conditions for irradiation were: 200 kv., 20 ma., 0.5 mm. Cu, 1.0 mm. Al, and a half-value layer equivalent to 0.9 mm. Cu. Control animals were inoculated with nonirradiated tumor tissue. The effects of irradiation first became manifest with a dose of 2,000 r in air. Although 100% of takes resulted, the normal latent period of 8 to 10 days was extended to 14 days. Increasing the dose to 2,500 r resulted in 60% of takes with a latent period of 18 days, while implants exposed to 3,000 r failed to grow. In 6 experiments, during which x-ray doses varying from 2,200 r to 2,600 r were used, 50 rats were inoculated with the treated tumor tissue. Of 19 negatives, 18 were immune to further transplantation of fresh lymphosarcoma grafts, though in 4 of the 18 tumors appeared but later regressed. The reason only a certain number of the animals became resistant may be that the number of viable tumor cells in each graft varied or that the amount of tumor implant was insufficient to produce a resistant state.—M. B.

On the Occurrence of Diverse Leukotic Conditions in an Inbred Mouse-Strain. KAALUND-JØRGENSEN, O. [Biol. Inst. of Carlsberg Foundation, Copenhagen, Denmark] *Acta path. et microbiol. Scandinav.*, **17**:438-452. 1940.

Four cases of generalized lymphomatosis, 2 of lymphatic leukemia, 1 of myeloid leukemia, 1 of atypical leukemia, and 1 of reticuloma of the spleen were found among 14 mice of 2 generations of an inbred leukemic strain (Ak), received from Furth. The author concludes that in mouse strain Ak the tendency to malignant disease in the hematopoietic system is inherited, while the type of the leukotic changes is determind by nonchromosomal factors.—M. H. P.

Untersuchungen über chronische Lymphadenose bei dänischen Rindern. [Investigations of Chronic Lymphadenosis in Danish Cattle.] EGEHØJ, J. [Skelskør, Denmark] *Acta path. et microbiol. Scandinav.*, **19**:327-378. 1942.

A review of the literature with a 3 page bibliography, and a report of original investigations. Lymphocytomatosis of cattle in Denmark is apparently not due to a

specific virus; a recessive hereditary factor may play a role in its development. The pathology is described in detail.—M. H. P.

Recent Experimental Studies on Leukemia. Furth, J. [Cornell Univ. Med. Coll., New York, N. Y.] *Physiol. Rev.*, **26**:47-76. 1946.

The extensive experimental work done on leukemia during the past few years is summarized in this review. The scope of this work is indicated by the headings under which the material is organized. These include sections on cytology and histology, endocrinology, nutrition, metabolism, and chemical and physical agents. In addition there are discussions of avian leukosis and the virus problem, and also of the somatic mutation hypothesis in the light of recent work in cytogenetics.—R. B.

Relationship of Antibody Content of Normal and Malignant Lymphocytes. Dougherty, T. F., White, A., and Chase, J. H. [Yale Univ., New Haven, Conn.] *Proc. Soc. Exper. Biol. & Med.*, **59**:172-175. 1945.

Antibodies have recently been demonstrated in normal lymphocytes, and the question arose whether they could be found also in the lymphocytes of lymphosarcoma. Male mice, 60 to 80 days old, of the CBA strain (Strong) were used. The lymphosarcoma arose in an estrogen-treated mouse of the C3H strain and is transplantable in 100% of CBA mice. The rapidly growing transplanted tumor kills the host in 2 to 3 weeks but does not metastasize. The antigen used was a filtrate of a 24 hour broth culture of *Staphylococcus aureus*. Each mouse was injected subcutaneously with the toxin solution, either before, or at the time of tumor transplantation. Sera, and extracts of normal and malignant lymphocytes were titrated for their antibody content. Nitrogen analyses of sera and extracts were made by the micro-Kjeldahl method.

Comparison of titers of lymphosarcoma extracts with those of sera and normal lymphocyte extracts indicated that the tumor cells had a somewhat higher antibody content. In cases in which antigen was given only before tumor transplantation, the tumor cells had antibodies; it was concluded that they were capable of securing antibodies from some other source in the body, presumably normal lymphocytes. The growth of an antibody-containing tumor transplant in normal mice was accompanied by the development of new antibody-containing malignant cells. Also normal lymphocytes of hosts receiving such a transplant were shown to contain antibody. There is a reversible exchange of antibody between normal and malignant lymphocytes.—M. B.

On the Nature of Gonadotrophin in Cases of Malignant Tumors of the Testis. Hamburger, C. [State Serum Inst., and Radium Station, Copenhagen, Denmark] *Acta path. et microbiol. Scandinav.*, **18**:457-484. 1941.

Hypophyseal follicle-stimulating gonadotrophin and chorionic gonadotrophin (assayed on rats and mice) were the only gonadotrophins encountered in the urine of more than 150 patients with cancer of the testis. The follicle-stimulating factor was found in about 75% of the cases of seminoma and small-cystic mixed tumor, and the chorionic factor in 3 cases of metastasizing mixed epithelioma of the testis and 1 case of uncertain diagnosis (primary extragenital chorionic epithelioma, or metastases of chorionic epithelioma from a minimal focus in the left testis). One patient with small-cystic mixed tumor (histologically malignant) with embryonal structure and syncytial trophoblast-like cells showed no increase in urinary gonadotrophin excretion shortly after removal of the primary tumor. However, following this, he excreted the follicle-stimulating factor and later, after large metastases had developed in the abdomen, he excreted both types of gonadotrophin.—M. H. P.

Studies on the Excretion of Androgen Substances and Gonadotrophin in Cases of Malignant Tumors of the Testis, Especially Seminoma. Hamburger, C., and Godtfredsen, E. [State Serum Inst., and Radium Station, Copenhagen, Denmark] *Acta path. et microbiol. Scandinav.*, **18**:485-502. 1941.

The urine of 15 of 19 men who had been treated for seminoma of the testis by unilateral castration and x-ray showed contents of hypophyseal follicle-stimulating gonadotrophin that were above normal (*i.e.*, above 50 mouse units per day), and very low contents of androgen (average 10 international units per day, or about $\frac{1}{5}$ the output of normal men). In 12 patients who excreted chorionic gonadotrophin (including those with mixed epithelioma of the testis and chorionepithelioma) the androgen excretion was also low, but was twice as great as in the patients with seminoma.—M. H. P.

Cancerous Changes of a Slow Course and Epithelial Hyperplasia in the Portio Vaginalis of Women, and Similar Changes Produced Experimentally in Guinea-Pigs. Bang, E. Report to Danish Path. Soc., Nov. 24, 1941: from abstr. in *Acta path. et microbiol. Scandinav.*, **19**:315-316. 1942.

Two cases are reported in which changes, "which must be termed superficial cancer," had persisted for more than 2 years before the appearance of manifest cancer in the portio vaginalis. The changes in the portio were characterized by dedifferentiation of the epithelium with abnormal nuclei, sometimes suggesting Bowen's disease, and with ingrowth into gland tubes and connective tissue. In a third case, which remained stationary, the epithelium was likewise dedifferentiated, but the nuclear abnormalities were less pronounced.

By folliculin overdosage and inoculation of infectious substance into the vagina of guinea pigs, the author succeeded in producing metaplasia of the columnar cervical epithelium with ingrowth into the orifices of the gland tubes, corresponding to the changes encountered in simple erosion in women.—M. H. P.

Experimental Tumors after Nerve Section in an Insect. Scharrer, B. [Sch. of Med., West. Reserve Univ., Cleveland, Ohio] *Proc. Soc. Exper. & Med.*, **60**:184-189. 1945; cf. *Science*, **102**:102. 1945; abstr. in *Cancer Research*, **5**:662. 1945.

During a study of the endocrine functions of the corpora cardiaca and allata in the insect *Leucophaea maderae* (Orthoptera), it was found that removal of both corpora allata, together with the posterior portion of the corpora cardiaca, resulted in the development of tumors. The tumors arose mostly in the anterior portion of the alimentary canal and in the salivary reservoir. Rarely, the

salivary glands were also involved. Endocrine disturbances following removal of the corpora allata and cardiaca were suspected as the cause, but further experiments indicated that destruction or interference with some adjacent structure was probably responsible. The recurrent nerve was suspected because of its relationship to the sites of tumor development. Three series of experiments were done. (1) The recurrent nerve was cut behind the corpora cardiaca and allata, leaving the glandular complex intact. (2) The recurrent nerve or its two ventricular branches were cut in the thoracic region. (3) The frontal ganglion, which contains part of the cells of origin of the recurrent nerve, was extirpated. All 3 types of operations resulted in tumors. In series (1) and (2) the incidence was 80% (54 animals used). Hence the neoplasms observed in the anterior portion of the alimentary canal and in the salivary complex were caused by interference with their innervation rather than by a disturbance of the endocrine balance. The tumors consisted of consecutive layers of cells, with nuclei that were pycnotic or irregularly vesicular with little chromatin. Often the cells broke down into a mass of brownish debris. The extent of tissue transformation in the anterior portion of the alimentary canal was such that probably it was incapable of normal function. Animals with these tumors lived from 10 days to several months after operation, with death apparently due to starvation.—M. B.

A Study of Folic Acid Distribution with Respect to Its Possible Relationship to Cancer. Loo, Y. H., and Williams, R. J. [Univ. of Texas, Austin, Tex.] *Univ. of Texas Publication No. 4507:* 123-134. 1945.

Assays of folic acid in the tissues of rats bearing Walker carcinoma 256 transplants and normal controls indicated that the acid is bound in various types of linkages. One type, present in spleen, skeletal muscle, and tumor tissues, is hydrolyzed by clarase; another, found in the liver of normal and cancer-bearing rats, is hydrolyzed by liver enzymes. A third, found in normal liver, is hydrolyzed by a combination of clarase and liver enzymes in the presence of phosphate buffer at pH 7 and 4% NaCl, but not in the presence of acetate buffer at pH 4.5. The linkage of folic acid to liver tissue differed strikingly in cancer-bearing rats to that in the controls. Clarase digestion of normal liver tissue released much more folic acid when the digestion was carried out in a phosphate-NaCl buffer than when it was carried out in acetate medium, while this was not true for liver tissue from cancer-bearing rats. The concentration of folic acid in a muscle adjacent to an implanted tumor in one hind limb was as high as that in the muscle of the normal hind limb, indicating that the growing tumor does not deplete the surrounding tissue of this material.—M. H. P.

Serological Analysis of a High-Molecular Crystallizable Protein in Myeloma Serum. Packalén, T. [Sero-Bacteriol. Inst., Helsingfors Univ., Helsingfors, Finland] *Acta path. et microbiol. Scandinav.,* **17**:263-272. 1940.

A serum protein of high molecular weight, crystallizing spontaneously from the blood serum of a patient with myeloma, differed from the proteins of normal serum in precipitation reactions against rabbit antisera. In anaphylaxis experiments performed in guinea pigs, however, this serological specificity did not appear distinct.—M. H. P.

Fibromatous Skin Lesions Produced by Repeated Blood Serum Injections in the Human. Marshall, W. [Spring Hill Coll., Mobile, Ala.] *Am. J. Surg.,* **69**:338-343. 1945.

Using himself as a subject, the author demonstrated the production of fibromatous skin lesions at the sites of repeated intracutaneous serum injections totalling 14 and 17 injections in two series. The sera used were: (1) that from a "Wassermann-fast" patient and, (2) his own blood serum; both were preserved with ½% phenol. Control injections of saline with ½% phenol were given into the opposite thigh. At the end of the injection periods (17 and 9 days respectively) biopsies of the experimental areas showed a condensation and thickening of the collagen material in the subepithelial tissue. The control areas were normal. The author postulates a positive chemotropism in the production of fibromatous growth, the presence of blood serum extravasations having the ability to attract fibroblasts.—W. A. B.

On the Metastasis Problem. Ostenfeld, J. [Biol. Inst. of Carlsberg Foundation, Copenhagen, Denmark] *Acta path. et microbiol. Scandinav.,* **19**:209-219. 1942.

According to the observations of Blumenthal and others, transplantable tumors can be transmitted by cell suspensions of organs apparently free from metastasis. The author produced tumors in mice by the subcutaneous injection of minced lung, spleen, liver, kidney or blood from mice bearing either the Ehrlich carcinoma or other tumors. These results are attributed to the transmission of tumor cells (escaping observation on microscopic study) rather than to a virus, since exposure of mice bearing the Ehrlich carcinoma to x-rays in a dose of 6,000 r (a dose believed to kill tumor cells but not viruses) rendered their lung tissue no longer capable of causing tumor on subcutaneous injection into other mice.—M. H. P.