ERYTHROCYTES


A Japanese girl, aged 12, with congenital hemolytic anemia, abnormal pigment metabolism, and red cell inclusion bodies following splenectomy was described. This patient was the second case found among Japanese. No abnormal hemoglobin was detected. Erythrocyte GSH and ATP were decreased. Autohemolysis was increased and was not corrected by glucose. No definite conclusion was reached on the nature of the inclusion body after electron microscopic study. The exact nature of the biochemical defect remained unknown. Twenty-seven reported cases with this syndrome were reviewed. It was stressed that “congenital hemolytic anemia with abnormal pigment metabolism and red cell inclusion bodies” should be considered as a syndrome rather than a disease entity.—K. F.


Laboratory examinations are essential for the guidance of the clinician in the treatment of hemolytic disease of the newborn. To recognize that the fetus is threatened by death in utero in Rh incompatibility, the following must be taken into account: the concentration and development of maternal agglutinins, though the interpretation of the results may be difficult, and the examination of amniotic fluid which may give valuable information. At birth, the decision for exchange transfusion depends on serologic and hematologic examinations, but mainly on the concentration of bilirubin in umbilical vein blood. During the first few days, the serum bilirubin must be estimated regularly to prevent the development of kernicterus. In cases of ABO incompatibility, the difficulties of serologic diagnosis are great, but the therapeutic problem presents itself only in the postnatal period and depends on the intensity of the jaundice. The difficulties of the technics and their interpretation were assessed and are due to several factors which the authors discuss in detail.—G. M.


Severe “Coombs-negative” anemia was discovered in an 8-week-old Negro girl who was hospitalized because of acute diarrhea. Following transfusion, anemia quickly reappeared, this time
accompanied by positive direct and indirect antiglobulin tests. Specific antibodies (anti-M and anti-C+E) were found, in addition to a pan-agglutinin. Treatment with ACTH, 6MP, heparin and anti-snake venom was ineffective. Thymectomy was performed 2 months after onset. The thymus was small and almost devoid of lymphocytes and plasma cells. No change in transfusion requirement was noted. Two weeks later, splenectomy was performed and a week later prednisone therapy was begun. A rapid rise in hemoglobin level ensued, followed by a marked fall in antibody titer. After 6 weeks of therapy, prednisone was discontinued and 17 days later the infant died. The postmortem hemoglobin was 1.7 Gm. per 100 ml.—J. B. S.


The direct Coombs reaction was studied in 18 cases of autoimmune hemolytic anemia not associated with elevated cold agglutinin titers. The erythrocyte coating substance was IgG-globulin in combination with complement in 9 and complement alone in 4. The heavy chain and both types of light chains were involved in the IgG-antiglobulin reaction. Variation in the strength of direct antiglobulin reactions with specific antisera to Bence Jones proteins of type K or type L indicated that the autoantibodies in 9 of these patients were a heterogeneous group of IgG-globulin molecules. —H. H. F.


The reaction involving the reduction of intracellular methemoglobin in the presence of glucose and Nile Blue permitted indirect measurement of the activity of G-6-P-D (Beutler). After incubation, the red cells were examined individually in a microspectrophotometer. The curves obtained permitted the determination of the degree of residual oxidized hemoglobin in each red cell. After incubation for 2 hours, red cells in which activity of G-6-P-D was normal produced a curve characteristic of oxyhemoglobin, red cells totally deficient in G-6-P-D activity produced a curve typical of methemoglobin and red cells with diminished activity produced a curve of intermediate activity. Four women heterozygous for G-6-P-D deficiency were studied and the level of enzyme activity measured in hemolysates was diminished by more than 50 per cent. A double population of red cells was found when individual red cells were examined in the microspectrophotometer: one population contained oxyhemoglobin, the other methemoglobin, and there were no intermediate forms. The results provided direct confirmation of the mosaic theory of Lyon.—H. H. F.


The markedly decreased G-6-P-D activity in skin cell cultures from Caucasians with erythrocyte enzyme deficiency and the normal or slightly decreased enzyme activity in cell cultures from similarly affected Negroes provided additional evidence for molecular heterogeneity in G-6-P-D deficiency in affected members of different ethnic groups. The close correlation between enzyme activity in erythrocytes and skin cell cultures from deficient Caucasians suggested a similar genetic control mechanism for enzyme levels in both tissues, i.e., the red cell defect, whatever its mechanism, also involved fibroblasts.—H. H. F.


Iraqi Jewish children with G-6-P-D deficiency did not demonstrate the abnormal oral glucose tolerance response reported to be present in G-6-P-D deficient adult American Negroes.—J. B. S.


A screening test for G-6-P-D deficiency was carried out on 830 adult African males attending an outpatient department in Kampala. Nine per cent showed a deficiency of the enzyme. The highest
incidence was in the Baganda. It was suggested that this increase may be due to the fact that these subjects live in an area with a high incidence of malaria.—T. H. B.


In the presence of high concentrations of sodium or lithium chloride, erythropoietin of high specific activity can be extracted with ethanol from human urine or rabbit plasma concentrates. The activity is improved further by ammonium sulfate or acrylamide gel column fractionation. An isolation scheme for human urine is given. The best fractions are nondialyzable and cause large increases in hematocrits and blood volumes of normal mice.—H. H. F.


Suppression of erythropoietic activity in rats poisoned with mercury bichloride was the result, primarily, of decreased elaboration of erythropoietin due to damage to the site of production of the humoral factor. Mercury bichloride by itself and retention of metabolites had little, if any, toxic effect directly on erythropoietic organs. The proximal convoluted tubules were postulated to be the site of formation or activation of erythropoietin and possibly were the site of inactivation or excretion of the specific inhibitor of erthropoiesis. The granularity of the juxtaglomerular cells was shown to have some type of relationship to erythropoietic activity. Although the juxtaglomerular cells might be another site of production or storage of erythropoietin, as postulated by other investigators, a more plausible explanation would be that the juxtaglomerular cells play a role in erythropoiesis via the renin-angiotensin system.—K. F.


The effect of transfusion-induced polycythemia on the formation of intrasplenic clones in x-irradiated mice injected with bone marrow cells was studied. Polycythemic animals showed a 3-fold decrease in the number of macroscopic clones. The suppressive effect was cell specific: no erythroid clones were formed and no inhibition was observed among granuloid colonies.—H. H. F.


Pure sheep pancreatic juice inhibited the uptake of iron from intact intestinal loops in rats. Lyophilized human gastric juice or crystallized trypsin did not. After dialysis of pancreatic juice, both the dialysate and diffusate inhibited iron uptake. These results confirmed the authors' previous results with commercial pancreatic extract and they suggested that a factor or factors in the pancreatic secretion played a role in the absorption of iron.—F. W. G.


Weanling rats in whom iron deficiency anemia was induced by dietary iron deprivation were treated with large, intermediate and small doses of iron. In the animals given a large dose, macrocytes appeared after 3 days and were gradually replaced by normal-sized erythrocytes. In the rats given intermediate amounts of iron, normocytic red cells appeared after 10 days. In the group receiving the smallest dose, the new red cells were larger than in the pretreatment period, but never became normocytic. Normal hemoglobin levels in the 3 groups were achieved after 5, 13 and 28 days, respectively. A similar relationship between the dose of iron and the degree of macrocytosis was seen in iron-deficient children and adults, although it was less predictable and demonstrated considerable overlap, particularly when low doses of iron were administered. These findings were consistent with the concept that red cell size is related to the rate of maturation, which in turn is governed by the erythropoietin level and the availability of precursors necessary for hemoglobin synthesis.—J. B. S.
ABSTRACTS


The biosynthesis of apoferritin by normal and thalassemic erythropoietic cells isolated from human bone marrow and by reticulocytes was described. Apoferritin biosynthesis was enhanced greatly in thalassemia. In β-thalassemia, the average amount of hemoglobin per cell was reported to be about 15–25 per cent less than the normal. The enhanced production of ferritin in thalassemia might account in large measure for this reduction. The early increase in synthesis of ferritin in young erythroblasts in thalassemia could lead to a decrease in the cellular iron available for hemoglobin production. There was no evidence that ferritin iron was utilized for hemoglobin synthesis. Apoferritin molecules bound approximately 500 times as many iron atoms as did hemoglobin. The increase in iron could have reduced hemoglobin synthesis which is known to be responsive to levels of iron concentration by negative feedback.—H. H. F.


A new variant of the normal minor component, Hb A₂, has been detected in a family that lives in Sphakia, Crete. Chemical studies of this abnormal hemoglobin, designated Hb A₂ δSphakiá, indicates a substitution of the histidyl residue number two of the δ-chain by an arginyl residue.—H. H. F.


Urinary excretion of radioactive hemoglobin occurred as early as 3 minutes after intra-arterial injection of labeled hemoglobin. The amount of hemoglobin excreted in the urine in 150 minutes varied from 4 to 15 per cent of the total injected. Analyses of tissues revealed maximal retention of the labeled hemoglobin at 150 minutes. The kidney retained the largest amount of hemoglobin per unit weight when compared to liver, spleen and bone marrow.—H. H. F.


The authors observed that erythropoietic microcells, quite similar to those often seen in certain erythropathies, can develop in vitro by mitotic anomalies induced by weak doses of X-rays. The cellular mechanisms and the theoretical and practical implications of this phenomenon were discussed.—G. M.


Study of 200 sedimentation rate curves, constructed point by point with the usual Westergren technic, led to the following observations. (1) The curves had a typical shape which allowed for recognition of a more or less prolongel phase where the real rate reached a maximum. (2) Reading every 10 minutes for an hour was sufficient, with few exceptions, to determine this real maximum rate. (3) Expression in millimeters per hour permitted comparison with the classic hourly rate which corresponds to a mean rate. This comparison revealed the theoretical and practical importance of the simultaneous estimation of the hourly and the maximum sedimentation rate.—G. M.


The content of free and bound tryptophan in plasma and erythrocytes of man and some animals, the tryptophan-binding ability of plasma and the tryptophan capacity of erythrocytes were studied after dialysis with a direct colorimetric method. Differences in the content of and capacity for binding tryptophan were found between nucleated and non-nucleated erythrocytes.—E. K.
HEMOSTASIS


The presence of platelet thrombi in lymph node vessels and of normal or increased numbers of megakaryocytes in the bone marrow have led to the suggestion that excessive platelet destruction explains the thrombocytopenia seen in patients with the Aldrich syndrome. The infusion of normal platelets into 3 such patients, however, indicated normal or near-normal platelet survival. The authors suggested that a defect in platelet maturation and/or release may be present in this disease.—I. B. S.


On the basis of appropriate experimental observations, the authors propose the following hypothesis. Platelets require an active energy-supplying metabolic process to remain unsticky, the adhesive form being the low-energy state in a system analogous to the contracted state of striated muscle. An active metabolic process is also needed to preserve platelet size and shape. This energy-yielding process involves splitting of ATP to ADP by an ATPase in the platelet membrane. In the presence of added ADP, the breakdown of ATP by ATPase is blocked by product inhibition. Addition of ADP to platelet-rich plasma inhibits an active process, disrupting the regulatory membrane system by which platelet “nonstickiness” is maintained. In the plasma, the added ADP is degraded by stepwise dephosphorylation via AMP to adenosine, which is then incorporated into the platelet; this reaction is not crucial for platelet clumping, but is probably important for ultimate dispersal of the ADP-induced platelet aggregate. ADP, AMP and adenosine appear to compete for sites on the platelet and this competition could account for the inhibition of ADP-induced platelet aggregation by AMP and adenosine. The net result of the inhibition of membrane ATPase by its normal product, ADP, leads to exposure of adhesive sites and permits platelet aggregation through intermediate secondary bridges containing calcium, fibrinogen or other proteins.—P. B.


The glycolytic activity of blood platelets after the addition of 15–30 units of thrombin was studied. Initially, a short-term increase in glycolysis was observed. After 1½–2 hours, glycolysis stopped. Other investigations were performed with clotted plasma to which 1 per cent trypsin was added. After this procedure, a few free platelets were found which showed limited retraction activity which was decreased when compared with controls. The author suggested that, after the addition of thrombin, a few platelets were not prone to either morphologic or metabolic changes typical for viscous metamorphosis.—L. D.


Thrombocytopenia is a frequent finding in youngsters with giant hemangiomas. This paper describes an infant with such a lesion in whom postcircumcision bleeding was associated not only with thrombocytopenia, but with deficiencies of fibrinogen and Factors V and VIII. Following radiation therapy, the tumor decreased in size and the results of coagulation studies returned to normal.—J. B. S.


Significant bleeding accompanied by a prolonged prothrombin time apparently can occur in young infants with diarrhea, particularly if treated with antibiotics and with milk substitutes that have a low vitamin K content. In such infants, prompt clinical and hematologic improvement can be effected by vitamin K administration.—J. B. S.

In this study, the hemorrhagic effects of puff adder venom were reappraised in vitro using modern technics. The prolongation in whole blood clotting time induced by the venom was not due to any defect in the thrombin-fibrinogen reaction, but was the result of a disturbance in the thromboplastin system. It was not established whether this was due to an interference with the formation of blood thromboplastin or to increased destruction. In addition, it was shown that the venom also interferes with the formation of the platelet head of the thrombus and blocks the platelet aggregating action of adenosine diphosphate.—T. H. B.


Tissue plasminogen activator was investigated in samples of arterial wall removed during operations for oblitative arterial disease of the lower extremities. Activities were determined in separate layers, using fibrin-agar plates, and were compared with standards of pig heart plasminogen. There was no difference between primary and secondary veins. Activity in the great saphenous vein decreased from proximal to distal parts.—L. D.

LEUKOCYTES


Seven members of a Cape Colored family demonstrated the heterozygous form of the Pelger-Huet anomaly. The sex-chromation appendage (drumstick) was seen in 2 of 6 affected females. No unusual predisposition to infection was noted and phagocytic activity against staphylococci was normal. No linkage was noted between this anomaly and blood group, PTC taste threshold, fingerprints, haptoglobin and hemoglobin type, G-6-PD activity or transferrin type.—J. B.S.


Rabbit arteries 1 mm. in diameter were frozen ultrarapidly while being perfused with blood. After freeze-substitution, embedding and sectioning, the radial distribution of leukocytes was studied microscopically. Leukocyte concentration increased from the center peripherally and reached a peak concentration at 8/10–9/10 of the radial distance. In the artery with the most uneven distribution of leukocytes, the maximum concentration exceeded the minimum by 100 per cent. Only 1–3 per cent of the leukocytes seemed to be in contact with the arterial wall.—T. E. B.


Investigations carried out in mice demonstrated rapid uptake of H3-antigen (or antigen fragments containing the H3-sulfanilazo determinant groups) by eosinophils and the subsequent eosinophilia in draining lymph nodes within 4 hours of primary antigenic stimulation. The early heavy accumula-
tion of H3 in eosinophils was thought to indicate that the soluble, heterologous protein induced the eosinophil responses in the absence of specific antibody. It seemed unlikely that antibodies were synthesized and released from lymph node cells in quantities sufficient to complex with H3-antigen prior to its incorporation by eosinophils. Eosinophils may have an important function in mechanisms of the primary immune response.—P. B.


Thoracic duct lymphocytes from neonatally thymectomized Lewis rats fail to produce runt disease in newborn Brown Norway rats when the latter are injected with up to 10 times the number of normal lymphocytes needed to cause runtting. The author suggests that the mechanism of the immunologic defects which attend thymectomy is more than just a quantitative one relating to lymphopenia. The immunologically deficient lymphocytes do seem, however, to confer tolerance, demonstrating the interesting dissociation between the mechanisms by which lymphocytes confer tolerance and produce runt disease. At least some of the lymphocytes are able to enlarge and divide when stimulated in vitro with phytohemagglutinin or with xenogeneic or allogeneic cells, but small lymphocytes from thymectomized animals have defective RNA metabolism as judged by a marked impairment in their ability to incorporate uridine-5-H3 or cytidine-H3 in vitro.—T. E. B.


Since histocompatibility antigens occur on leukocytes, there is a great need for methods for leukocyte typing. The authors have found good agreement between cytotoxicity and hemagglutination assays in detecting appropriate leukocyte antigens, but they emphasize the importance of using more than one assay method for correlating compatibility for each new leukocyte group with survival of homotransplants.—P. B.


Lymphocytes from patients with systemic lupus erythematosus (SLE) and scleroderma destroyed fibroblasts of human embryos in tissue culture. A similar effect was observed with lymphocytes from patients with SLE in human kidney-cell cultures. Lymphocytes from a control group showed no such effects. It was thought that these experimental findings demonstrated the role of immune lymphocytes in the pathogenesis of SLE. The authors assumed that it was these cells which constitute the main link in the pathologic process and produce the destruction of tissues, while autoantibodies are of secondary importance.—P. B.


The authors compared the transformation of lymphoid blast cells and small lymphocytes. The study was made possible by injecting the same absolute number of lymph node cells, labeled with tritiated thymidine, into F1 (DBA/2 × C57B1/6) recipients irradiated with 500 rads. The transformation of donor cells was found to be essentially the same when the preparation injected was rich in labeled blast cells or in small lymphocytes.—C. M.


Intravenous injections of phytohemagglutinin were given to 27 patients who were receiving various cancer chemotherapeutic agents continu-
ABSTRACTS

Susceptibility to the Gross leukemia virus in mice has been studied in crosses of virus-resistant and virus-susceptible inbred strains. Two independent loci appear to determine virus susceptibility. One (Rgv-1) is closely linked to H-2 in the ninth linkage group, while the other (Rgv-2) segregates independently.—H. H. F.


The study demonstrated the possibility of detecting the Charlotte Friend or Rauscher virus by allogeneic chimerism. Heterospecific chimerism was proposed as a method for the detection of possible leukemogenic viruses in man.—G. M.


The investigation demonstrated the possibility of detecting the Charlotte Friend virus with heterospecific rat-mouse chimeras. Heterospecific chimerism was proposed as a technic for detecting the possible existence of a leukemogenic virus in man.—G. M.


Mice bearing transplanted leukemia L 1210 were treated with total body irradiation, followed by a graft of allogeneic hematopoietic cells. All the grafts used contained sufficient marrow cells to ensure the restoration of the myeloid tissues. In different groups, recipients were given marrow cells to which had been added either lymph node cells, marrow cells, thymus macrophages or a mixture of thymic cells and macrophages. An adoptive immunotherapeutic effect was obtained with lymph node, thymic and bone marrow cells, but peritoneal exudate cells were without activity and did not appear to increase the effect of a thymic graft.—G. M.
ABSTRACTS


In children receiving adrenocortical steroids for nonhematologic conditions, total white cell counts and neutrophil counts rose significantly after a week of therapy, reached peak levels after 3 weeks and then fell to pretreatment levels about a week after cessation of therapy. The mean white count was almost entirely due to increased numbers of neutrophils. Lymphocyte and monocyte counts did not change significantly. —H. H. F.


A case of an atypical group A was presented in which negative reactions with anti-A$_1$ and anti-H sera were obtained. Examination of the family revealed a dominant hereditary modification of antigen H which differed from phenotype Bombay and for which the symbol $H_m$ was used. This new blood group was found in two generations in four members of the family, twice as an atypical $O_{Hm}$ group and twice as $A_{1Hm}$. The modification was characterized by a considerable reduction in the amount of H antigen in red cells, while it was present in normal amount in secretions. In subjects with group A, it caused incomplete development of antigen A/A$_{1Hm}$/—L. D.

MISCELLANEOUS


The authors were not able to confirm the previously reported relationship between ingestion of pregnanediols, either 3-alpha, 20-alpha, or 3-alpha, 20-beta isomers, and accentuation of neonatal hyperbilirubinemia. They were unable to isolate pregnane 3-alpha, 20-beta diol from breast milk capable of inhibiting bilirubin conjugation in vitro. —J. B. S.


The ABH antigens are richly represented in the smallest embryos available, 5-8 mm. i.e., from the 5th week after fertilization. They are found on the cell membranes of the endothelium throughout the cardiovascular system and of the epithelium of the integument, the digestive tube, the mesonephric and (later) Mullerian ducts—in short, in all epithelial elements with the exception of those of the central nervous system, adrenals and liver. The epithelial antigens are at their maximal distribution at 35 mm., after which time they begin to wane. Their disappearance coincides with recognizable steps of morphologic advancement and often with an ascertainable token of function, e.g., secretion of mucus in the gastrointestinal tract, trapping of radioactive iodine by the thyroid, and production of growth hormone by the pituitary. Only the stratified epithelia of the integument, esophagus and lower urinary tract show persistence of the antigen into and throughout extrauterine life. The endothelial antigens are also permanent.—H. H. F.
ABSTRACTS

distinction between acute histiocytosis X and malignant leukemic reticulosis. Some of the localizations of the disease are emphasized: hepatic involvement leading to cholestatic cirrhosis and pulmonary extension with diffuse cystic changes. The prognosis in histiocytosis X has been the object of special study. The young age of the patient, the degree of visceral extension, the anemia and the leukopenia should be regarded as poor signs. Cortisone is of value in the treatment of the acute disseminated forms. Cytotoxic agents and radioisotopes should be avoided. The etiology of histiocytosis X remains unknown.—G. M.


The level of the enzyme which catalyzes the hydrolysis of sphingomyelin was determined in tissue samples from patients with Niemann-Pick disease and was compared with tissue specimens from other human sources. The metabolic lesion in the classic infantile form of Niemann-Pick disease appeared to be attributable to drastic attenuation or loss of activity of the enzyme.—H. H. F.


The histology of the lymph nodes and spleens of rabbits challenged with BGG was studied and correlated with the molecular class of antibody present in the serum. The same cycle of events was found in rabbits synthesizing mainly or exclusively IgM antibodies as the result of 6-MP treatment. It was concluded that the immunoglobulin "sequence" was mediated by two independent lines of cells, each of which originated as a large pyroninophilic blast cell that matured into a plasma cell. One line of these cells synthesized IgM antibodies, the other IgG antibodies. In a second set of experiments, the histologic consequences of the inhibition of IgM antibody synthesis by passively infused IgG antibodies was examined. The infusion of specific IgG antibodies suppressed follicle and germinal center formation in immunized animals and resulted in the appearance of numerous eosinophils in lymph nodes and spleen. The clusters of mature plasma cells which were also found may indicate the acceleration of blast cell maturation induced by the passively infused antibody.—H. H. F.


The radiosensitivity of immunologically competent cells was not altered by contact with the antigen in vivo. The results of these experiments indicated that the relative radiosensitivity of the secondary immune reactions in the whole animal does not result from a qualitative modification in the cells by contact with the antigen. It was suggested that the increase in the number of immunologically competent cells induced by contact with the antigen was the reason for the apparent radiosensitivity.—G. M.


Immunocconglutinin was investigated in 1000 blood donors and titers greater than 1:2 were found in 150. This incidence was much lower than those published by Polish and British authors. One possible explanation was the relatively strict selection of donors with regard to standards of health. An increased percentage of immunocconglutinin was found in patients with blood diseases.—L. D.


The cleavage of S-S bridges between polypeptide chains did not influence the binding of Rh0 (D) antibody to the antigen. As was shown with the indirect Coombs technic, only H-chains from the polypeptide chains of IgG-globulin with Rh0 (D) antibody properties bound to Rh0 (D)-positive

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erythrocytes, while L polypeptide chains did not. It was assumed that the site combining with Rh<sub>0</sub> (D) antigen-determinants was located in the H-chain of the molecule.—S. R. H.


During the last ten years, the authors have noted 4 cases of anti-Rh iso-immunization in 731 first pregnancies, 267 in 751 second and 220 in 751 third pregnancies. Cases occurred even in the seventh or eighth pregnancy. The first appearance of hemolytic disease in children of the same parents was frequently benign; of 192 affected children examined, 27 recovered without treatment, 96 were cured by simple transfusion or one exchange transfusion, 44 were severely affected and received repeated exchange transfusion and 25 died, more than half in utero. In the most severely affected families, there was indisputable evidence of the efficacy of treatment, i.e., premature delivery and exchange transfusion. Within each group and despite treatment, however, there was a tendency towards progressive aggravation of the disease during succeeding pregnancies.—J. C.


The average values of complement were studied in 80 mother-child pairs. Cord blood and blood taken from the mother were used. The average values were compared and the role of ABO, Rh and MN blood groups and the incompatibilities of these groups were studied. C'-determinations were carried out by the method of Kabat and Mayer.—S. R. H.

NK/Ly ASCITES TUMOUR CELLS LABELED WITH Cr<sup>51</sup> AND THEIR USE IN IMMUNOLOGIC INVESTIGATION. J. Toperczer and G. Elek. From the National Oncological Institute, Budapest, Hungary. Nuclear medizin 5:12, 1965.

Labeling was rapid and depended upon the specific activity of the solution and on the concentration and age of the NK/Ly ascites tumor cell suspension. The labeled cells were used with immunolysis to determine the titer of antitumor immune sera. The nucleated cells were broken down by the action of antibodies and the amount of Cr<sup>51</sup> released served to indicate the degree of lysis. This method presented the possibility of observing lysis of nucleated cells directly.—S. R. H.