ABSTRACTS OF RECENT PUBLICATIONS OF THE PROFESSIONAL STAFF OF THE HENRY FORD HOSPITAL AND THE EDSEL B. FORD INSTITUTE FOR MEDICAL RESEARCH


"Petechial" angiomata are acquired capillary tumors which closely simulate true petechiae. These angiomata probably represent forme fruste or early lesions of senile angiomata. There are no regularly associated internal diseases. Increased tortuosity of the scleral vessels is a frequent concomitant finding.


Medicine will progress if the new is tried. But it must be tried only for serious reasons by seriously interested and experienced students of drug action and toxicity; tried by those who are equipped with an optimum of time, instrumentation, technical and laboratory support in their evaluation task and who will see it as their clear duty to make their observations in an unbiased fashion and to report them thoroughly, promptly, and objectively, to their colleagues through various means created for the exchange of scientific information by professional societies.


$3\beta, 17\beta$-Androstanediol is effective in the suppression of advanced breast cancer in postmenopausal women. How it actually compares with testosterone propionate will have to await more extensive studies. In this double-blind study, 3 regressions occurred in 21 patients on androstanediol, and 2 regressions occurred in 23 patients on testosterone. Androstanediol appears to be less masculinizing than does testosterone propionate.


Obstruction of the duodenum is rarely caused by a portal vein passing anterior to the duodenum. A patient with this condition in whom the duodenal obstruction was relieved by a duodeno-duodenostomy is recorded. Pneumatosis cystoides intestinalis of the lower ileum was also present in this patient and disappeared following relief of the duodenal obstruction.

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A survey to detect chronic bronchitis and asthma-like conditions is reported. One-hundred and seventy-two adult men and women more than 40 years old, employed in a bank, were questioned regarding respiratory symptoms. Spirograms were obtained, and the maximal midexpiratory flow was computed for each subject. Forty-two persons (roughly 24 per cent of the total) had respiratory symptoms suggesting the likelihood of chronic pulmonary disease. Ventilatory function in 27 of these persons was not impaired. In 15 persons, there was evidence of impaired ventilatory function. Men with chronic cough and expectoration had a significantly lower mean maximal midexpiratory flow than men without cough and expectoration. Prolonged cigarette smoking was closely associated with chronic cough and expectoration. Ventilatory function in male non-smokers was significantly better than in smokers; no significant difference in ventilatory function was found between women non-smokers and smokers.


The association of diabetes mellitus with porphyria, first reported in 1949, has since been noted by several authors, as has the associated disturbance of iron metabolism and hemochromatosis. It would seem that the metabolic defect of porphyria may actually result in the development of diabetes mellitus due to the disturbance of iron and pyrrole metabolism. A patient with porphyria cutanea tarda is reported in whom diabetes mellitus developed 4 years after the onset of cutaneous symptoms. The striking bluish-gray tint of the skin and increased iron in the bone marrow were thought to represent early hemochromatosis. The nature of the enzymatic blocks in the different forms of porphyria, their method of action, and the rationale of chelation therapy are discussed. A case report in which chelation resulted in striking improvement of liver function is quoted. It is suggested that chelation may also reverse diabetes mellitus secondary to the disturbance of porphyrin metabolism when the latter is corrected. We plan to treat our patient with chelation in an attempt to control both his porphyria and diabetes.


Despite various clinical successes with the rauwolfia's, thiazides and hydralazine as antihypertensive agents, treating the more severe forms of hypertension still remains a difficult problem. A malignant hypertension or hypertension with complications (cardiac insufficiency, azotemia, papilledema, and the like) particularly, are often unresponsive to these agents. Although these forms of hypertension have responded to the ganglionic blocking agents of which mecamylamine (Inversine®) is most representative, the severity of side reactions to these agents — constipation, blurring of vision, etc. — limits their therapeutic usefulness. Recently reference to two
new antihypertensive agents which may replace the ganglionic blockers for the more severe forms of hypertension appeared almost simultaneously in the clinical literature. One of them was bretylium tosylate (Darenthin) and the other was guanethidine (Ismelin). As a result of our study we conclude that guanethidine demonstrates definite superiority over the other two agents — both from the point of view of therapeutic effectiveness and in the important area of lessened or innocuous side effects.


A survey of the status of the use of relief chambers in the construction of complete upper dentures was made by a review of the literature and by a questionnaire returned by the prosthetic departments of fifty-three dental schools. The results indicate that opinions and practices are widely variable, that the question is an open one with many ramifications, and that the basis for much of what is done is in need of further study and appraisal.


A study was made of 85 patients who had postoperative myelograms and a second operation. These represented 6.9% of all positive myelograms studied. The time interval between operations varied from a few weeks to 13 years. A correct preoperative diagnosis was rendered in 71 cases, or 83.5%, before second operation. In 9 cases scarring, with or without bony overgrowth, was found at operation. The remaining 5 represented single cases of various types, and thus 14 were incorrectly diagnosed. Following the second operation 35 patients diagnosed were asymptomatic, 23 were improved, 22 were not improved, and 5 had no follow-up.


The concept of utilizing a diseased portion of the intestinal tract for anastomotic purposes is so contrary to generally accepted surgical principles that many surgeons are loathe even to consider the operation. However, a reevaluation of the problem appears to be indicated when it can be shown that the operation can be performed without unduly jeopardizing the patient's life or the opportunity for restoration to a satisfactory condition of health. The follow-up period of this series is much too short to formulate any conclusions regarding the two really important questions, viz., what is the chance of a serious exacerbation in the retained rectal segment; and what is the hazard of carcinoma? Abel, with an extensive experience of over 200 ileo-rectostomies, states that carcinoma has developed in only 2 patients, an incidence of 1.0%. These potential dangers are indicative of the necessity for keeping these patients under continuous surveillance. All that can be said at the present time is that the operation is feasible and that the vast majority of patients are extremely grateful for having deferred, at least temporarily, the unpleasant features of an artificial anus.
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Experiments on normal and depancreatized bitches were carried out to determine how well multiple doses of 90 r or less of X radiation are tolerated, and whether there are any metabolic effects suggesting stimulation or suppression of the adrenals. In two normal animals, total dosage for the main portion of the trunk was 574 and 3549 r, in 4 and 22 months, respectively; in the depancreatized one, 807 r in 9 months. Dosages for head and pelvis approximated 44% of these amounts. Food intake was constant, and daily records were kept of body weight, water intake, urine volume, and urine nitrogen. The general condition of all animals remained excellent. Periods of estrus continued. Weight was maintained or increased during long series of exposures. No changes in water balance or nitrogen output occurred which resembled those observed in dogs receiving corticotropin or hydrocortisone. In the depancreatized animal, the insulin requirement, known for 5 preceding years, was unaffected. Thus no evidence for stimulation or suppression of adrenal function was obtained. Histological examination of bone marrow and other tissues of the animal which received the largest total dose gave little evidence of damage. Moderate increases in urine volume of the normal animals suggested possible early renal impairment.


Despite many studies on staphylococcal infections in the surgical patient, the medical patient, and the infant, there is a dearth of bacteriological data on dermatological patients, especially in-patients. This paper presents representative bacteriological data on some of the out-patients and in-patients treated in this department during the period 1955-1960. The antibiograms and phage types of strains of *Staphylococcus aureus* are listed and correlated with the diagnoses of the patients and sites from which the strains were isolated. Of 2545 different strains from 2016 patients, about 60% were resistant to penicillin, with about 30% resistant to penicillin only. Approximately 20% were resistant to tetracycline; more than half of these were resistant to streptomycin as well. No increase in the percentage of antibiotic resistant strains isolated annually was observed.


A case of Kaposi's varicelliform eruption in a patient with Darier's disease is reported. Darier's disease is regarded as fundamentally a dyskeratosis rather than an eczematous dermatosis, and is transmitted as a simple dominant characteristic. This followed contact with labial herpes simplex. The Darier's disease cleared slowly following the episode of Kaposi's eruption and treatment with high doses of vitamin A.

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In a previous paper we have reported the results of silver and dopa reactions performed on normal and vitiliginous skins. It seems pertinent to do similar studies on the skins of patients suffering from incomplete generalized albinism. Incidental to these studies, which entailed exposing our subjects to progressively increasing doses of ultraviolet light, we were able to observe these patients during their change in capacity to tolerate sunlight. Our study indicates that: The melanocytes are present in normal numbers and distribution in the skins of albinos and are dopa-positive. They appear to be activated by ultraviolet light irradiation. The enzyme, tyrosinase, is present in the albino melanocytes but is possibly in an inhibited form. It is possible that there is, in addition, a block of pigment transfer from the albino melanocytes to the epithelial cells of the epidermis. Methoxsalen appears to be effective in increasing skin tolerance to sunlight in albinos, although it does not result in tanning.


We know from the earliest medical writings, about 3500 years ago, that cutaneous diseases have always constituted one of the major interests of medicine. Three dermatological textbooks were published before 1850 in Europe, and one in the United States. For many years dermatology included syphilology, and leading contributions were made to these fields by the investigators Schaudinn, Wassermann, and Ehrlich. The evolutionary development of dermatology, from the morphologic and classification era to the present functional era, has been accompanied by the emergence of the specialty as a clinical science. Allergic mechanisms of cutaneous disease make it evident that the specialty has an important stake in the field of allergy and immunology, as partially illustrated by epidermal sensitization, local and general sensitivity, cross sensitization, atopy, drug allergy, and serum and cell antibodies.

Of late years there has been an unparalleled surge of interest in cutaneous physiology and biochemistry of the skin, leading to the concept of enzymatic basis for itching, evaluation of sweat retention, elucidation of pigment metabolism, and other advances too numerous to be mentioned. The diseases of the skin represent 8 to 12 percent of the practice of medicine. Dermatology is an increasing challenge, an unlimited and continuing opportunity and offers the fellowship of lifelong enthusiasts.


It is probable that cutaneous bacterial infections account for more disability than any other single group of skin diseases. The importance of learning to recognize the classic signs of bacterial invasion of the skin and mastering the fundamental principles of management of such infections is obvious because each day almost
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every practicing physician will see several patients in this category. In recent years the increase of both cutaneous and systemic infections due to antibiotic resistant staphylocci, especially in hospitalized patients, has compounded the problem.

The management depends on classification of pyoderma, bacteriology, predisposing factors, and proper use of antibiotics. Some of the most severe primary problems are impetigo, eczema, deep folliculitis paronychia and erysipelas. Skin damage either by disease or trauma is subject to secondary bacterial infection, usually coagulase-positive staphyloccoci, beta hemolytic streptococci or both. It is important to recognize the pre-existing skin disease such as scabies, contact dermatitis, or similar conditions. Suppurative hidradenitis may be a very severe disorder of the axillae, groins or perianal region, calling for surgical treatment of the deep seated nodules.


In the differential diagnosis of certain facial and parafacial lesions, it is well to consider the possibility of dental abscess with the formation of a sinus tract to the skin. A cutaneous lesion of granulomatous or, less often, neoplastic appearance, occasionally exuding serous or purulent material and involving the inner canthus of the eye, the nasolabial fold, the chin, neck, or adjacent area, should be regarded as a possible exit point for a draining, chronic dental abscess. Occasionally the abscess may point beneath the skin and appear as a fluctuant cystic swelling which might well be mistaken for a boil or a carbuncle or for an infected epithelial cyst, a dermoid cyst, a branchial cleft or thyroglossal duct cyst, a parotid fistula, or even a tuberculous or deep mycotic infection. The combination of dental abscess and fistula tract formation to the skin is a syndrome often misdiagnosed. Three such cases were noted within a year's time.


A case of ventricular flutter due to quinidine, successfully treated by isoproterenol, is reported. A review of the literature on quinidine intoxication failed to reveal any patient previously treated by this drug. Because of the theoretical reasons discussed, and because of the ease of administration of isoproterenol, we believe this drug to be the best antidote available at present for the treatment of cardiac arrhythmias due to quinidine. In the future its ready availability at the patient's bedside could be a life-saving measure.


Eighty peroral mucosal biopsies of the stomach and small intestine were attempted employing the Crosby capsule. Tissue was obtained in seventy-one attempts (89 per cent). The specimens were adequate for histologic examination and diagnosis in all
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but four instances. The diagnostic contribution of these biopsies in a variety of conditions is discussed. Peroral biopsy is most useful in the diagnosis of diffuse disease of the gastric or intestinal mucosa. The discomfort to the patient is minimal, and we have encountered no untoward complication of the procedure.

PULMONARY VEINS IN CONGENITAL HEART DISEASE IN THE ADULT.

Pulmonary veins in congenital heart disease reflect the flow of blood through the lung fields. In those conditions which lead to an increase in flow, the veins are large. In lesions such as pulmonary stenosis and pulmonary hypertension, leading to shunt balance and reversal, in which the cardiac output is reduced, the veins are small. In patent ductus arteriosus, evaluation of the state of the pulmonary physiology can be made by comparing the size of the veins with the size and configuration of the arteries. In patients with pulmonary hypertension, a successful surgical result depends upon the presence of a significant left-to-right shunt. Vein size offers one more method of evaluating the amount of such a shunt.


An automated device for continuous recording of vacuum condensed, pile-produced metal radio-nuclide surface concentrations, down to $10^{-11}$ g/cm², has been designed using scintillation counters for $\alpha$, $\beta$, or $\gamma$ detection. Continuous or interrupted condensates, scanned through special collimators, are driven by a variable speed transport mechanism. A chart indexing system locates the point of assay on the film. Film thickness is determined either by gravimetric or chemical calibrations on the device itself. Best resolution is for particulate emission and is reduced for photons, due to gamma leakage through the collimators. 5 mm strips at about $14 \times 10^{-3}$ mc total activity are resolved at 0.5 mm edge-to-edge separation, using a 2 mm “square” aperture, with Au¹⁹⁸ gammas. The same strips at about $9 \times 10^{-3}$ mc activity are resolved for Au¹⁹⁹ betas at 0.25 mm separation, using a 1 mm “V”-type aperture. 1 mm regions at 1 mm separation are resolved for Au¹⁹⁸ betas or gammas of activity between $10^{-3}$ and $10^{-4}$ mc. Ratio of recorder peak output to specimen activity is nearly linear; at 98 per cent and 96 per cent for particulate and photon emission respectively.


Three beta-excited X-ray source types (the compound, apposition, and mixture source) have been designed, and the photon spectra compared. Each source in a

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series was assembled using a single target element with the concentration of pure beta emitter held constant for the series. The apposition source was studied with varying target thicknesses. The compound sources were crystalline precipitates of molybdate and tungstate groups compounded with the noncarrier-free beta emitter. The mixture source consisted of a fine-milled target powder with the beta emitter adsorbed on it. Assay of the x-ray source emission has been done on the Radiation Instrument Development Laboratories (RIDL) 100-channel analyzer with a 3-in. NaI detector. Variation in the spectra exists between the source types of a series. Anomalous peaking occurs with the Sr$^{90}$ MoO$_4$ source emission at 29 kev. The compound source, potentially productive, demonstrates poor characteristic spectra.


Definite bacteriologic cure was achieved in 21 (77.8 per cent), and probable bacteriologic cure in an additional 3 (11.1 per cent), a total of 24 (88.8 per cent) definitely or probably cured. Bacteriologic failure was observed in 3 patients (11.1 per cent); however, 2 died of an associated condition before the planned therapy was completed. Oral administration of 7.2 gm. of penicillin per twenty-four hours for prolonged periods was well tolerated. Penicillin V, 1200 mg., administered orally every four hours, produced penicillin serum concentrations comparable to those achieved with 600,000 units of aqueous procaine penicillin G given intramuscularly every six hours. One of the 27 patients failed to absorb "adequate" amounts of penicillin from the gastrointestinal tract, and in this patient bacteriologic relapse occurred. Thus, oral penicillin therapy of bacterial endocarditis requires monitoring of the adequacy of intestinal absorption of penicillin by determination of serum concentration or serum inhibitory activity in each patient. With this limitation, the oral route may be substituted for the parenteral in the various therapeutic regimens advocated as successful for treatment of this disease.


The extraction of a-glycerophosphate dehydrogenase in soluble form with the aid of phospholipase A from acetone powders of pig and sheep brain and of beef skeletal muscle mitochondria has been described. All snake venoms known to be good sources of phospholipase A liberated the dehydrogenase in soluble form, whereas phospholipases C and D as well as a general lipase from wheat germ were completely ineffective. An inactivation, which amounts to about 50% in the phenazine methosulfate assay routinely used, accompanies the release of the dehydrogenase. Both the inactivation and the liberation of the enzyme from the particle appear to be the result

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of the action of phospholipase A. A procedure for the partial purification of the enzyme from pig brain mitochondria was described. The purified preparation appeared to be homogeneous in electrophoresis but heterodisperse in the ultracentrifuge. Chromatography on hydroxylapatite columns resulted in several enzymatically active peaks. The purified enzyme ($Q_0 = 2600$) was found to contain non-heme iron (1 mole per $3.5 \times 10^4$ g of protein) and flavin (1 mole per $2.1 \times 10^4$ g of protein) as the only recognizable metal or vitamin constituents.


Methaminodiazepoxide (Librium) was beneficial for 60% of obsessive compulsive patients and for about one-third of others suffering from chronic neuroses and/or depression. These benefits achieved by patients previously considered therapeutically unpromising indicate that this drug is a valuable addition to our armamentarium. In the dosage of 10 mgm. q.i.d. side effects were minimal.


The neural coding system for pitch perception has been a concern of neurophysiologists for some time. The brilliant investigations of such men as Wever, Davis, von Békésy, Tasaki, Galambos, and others, have gone far in describing the physical and neural events occurring during the reception and transmission of auditory information. It is probably correct to say that most of those who have applied themselves in some way to problems relating to pitch perception have accepted as a working hypothesis the concept that pitch coding is based on both the frequency and the spatial patterning of neural impulses, with frequency being more important for low tones and place of maximal stimulation along the receptor organ being more important for high tones.

The purpose of this paper is to examine the neuroanatomical structures and physiological mechanisms of the cochlea and attempt to correlate them with psycho-physical measurements of hearing. All of the data is taken from experiments on cats performed during the past ten years. The methods used to spatially orient sensory and neural units in the cochlea by graphic reconstruction, as well as the techniques for behaviorally conditioning cats for pure-tone thresholds and for pitch discrimination, have been described elsewhere. Reports follow under the following headings: Frequency Localization on the Organ of Corti and Spiral Ganglion, Threshold Sensitivity and Pitch Discrimination in the Cat, Localization and Spread of Fields of Excitation in the Cat, Cochlea as a Function of Frequency and Intensity, Hair Cell and Ganglion Cell Populations and Auditory Thresholds, and Weber Fraction Cell Populations and Frequency Distribution.
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Adjuvant induced arthritis is believed to be due to an immunological process associated with the development of delayed hypersensitivity to a component of the injected mycobacterial adjuvant. However, since pleuropneumonia-like organisms (PPLO) may cause arthritis in rats, it was necessary to determine whether such microorganisms play any role in adjuvant disease. This article reports attempts to cultivate bacteria and PPLO from affected tissues and to transfer disease to normal recipients. No evidence for an infectious agent was obtained.


Rheumatoid arthritis is a clinical diagnosis applicable to a fairly consistent pattern of symptoms and signs. It constitutes a segment in the broad spectrum of the diseases of connective tissue. While the etiology is unknown and hence no "cure" is available, certain empiric principles of treatment have been found to be of value. As a working rule, the earlier the diagnosis is made and the earlier comprehensive therapy is instituted, the better will be the outcome in the individual patient. We have attempted to alert the practitioner to the early manifestations of this disease and to suggest a therapeutic approach which emphasizes measures of proved value.


The author has emphasized some of the principles which are important in the administration of nerve block anesthesia. To know the anatomy of nerve distribution and the exact region which is to be operated upon is most important. For example, closed or open reduction and internal fixation of fractures of the meta-carpal bones always require ulnar nerve anesthesia (because of the attachment of the interosseus muscles). The pneumatic tourniquet was always used with nerve block anesthesia. The tourniquet was very well tolerated by the patients for 30-45 minutes, after which time it had to be released for 5 minutes and reapplied. The author in a few cases reapplied the tourniquet 3 times with no discomfort to the patient. The author believes that nerve block anesthesia is safe for the patient and a satisfactory type of anesthesia for use by the surgeon.


The results attained in 426 mitral commissurotomy patients who have been followed from 2 to 8 years have been summarized. The short and long term results were observed to be significantly different depending on whether atrial fibrillation was present. In an attempt to clarify the indications for open mitral commissurotomy
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in mitral stenosis, those patients with a high operative and late mortality as well as poor late functional results have been further studied. Two-hundred (43 percent) of the 426 patients had developed atrial fibrillation by the time of commissurotomy. This group of patients received the most unsatisfactory results, largely due to fatalities occurring from arterial embolization. The results of 34 open operations on the mitral valve are presented. Thirteen of these procedures were carried out for pure mitral stenosis and four for combined stenosis and insufficiency. The indications for open surgery in the patients with pure stenosis were: previous embolic disease in 4 cases and restenosis in 9. Examples of each type are given. The high operative mortality and poorer late results attained with the closed operation in all patients with atrial fibrillation indicate that this finding is probably sufficient indication for open mitral commissurotomy.


New concepts in chemotherapy for inoperable cancers include the use of antimetabolites that by the mechanism of their action necessitate prolonged intra-arterial infusion. A simple method using an inexpensive pump for these intra-arterial infusions is described. The method and pump are particularly useful because of their practicality, dependability, and mechanical simplicity. This technique can easily be applied to prolonged intra-arterial drug administration for other purposes.


The method of exploring the abdomen by endoscope, developed early in the century by Kelling and by Jacobaeus, today represents a valuable diagnostic procedure. Objective documentation of laparoscopic findings in a simple and safe way has become possible by the use of modern equipment. Results obtained with a Sass-Wolf photolaparoscope have been discussed and illustrated by 12 color reproductions of intra-abdominal views.


A case of aorto-esophageal fistula is reported resulting in the death of the patient, who previously underwent esophago-gastrostomy for carcinoma of the esophagus. Primary peptic ulcer, due to the digestive effect of gastric juice at a site of lessened resistance, and secondary invasion by yeast-like organisms as a contributory factor, are proposed as causes of this unusual complication of esophago-gastrostomy.

Ovarian carcinoma has an unpredictable course and, despite dissemination of the disease, long-term survivals without therapy occur. Only when actively progressive and symptomatic disease is present is systemic chemotherapy indicated. Effective palliation of symptoms and possibly also some prolongation of life is possible in approximately one-third to one-half of the patients with advanced ovarian cancer. Chlorambucil and cyclophosphamide appear to be, presently, the drugs of choice in chemotherapy of ovarian cancer because of their relative safety and ease of oral administration, rather than any greater efficacy. Cross-resistance seems to be present between different radiomimetic drugs. Therapy with drugs with different mechanisms of action (such as 5-fluorouracil and Vincaleukoblastine) sometimes are effective in radiomimetic resistant patients.


Whipple in his original description of the disease, mentioned abnormal non-lipid in the intestinal mucosa and mesenteric lymph nodes, but later observers emphasized the fatty accumulations and neglected the less obvious non-lipid abnormalities. In the present report attention is redirected toward the non-lipid substance. With attention focussed on the ubiquitous SPC cells and their PAS-positive contents the question arises as to the relationship between these cells and the PCC with which they are associated. The majority of the evidence supports a conclusion that the PAS-positive substance, including the sickle-form particles, occur in the SPC cells as a result of cytoplasmic elaboration. It seems feasible that in the intestine of Whipple’s disease the presence of an abundant, abnormal protein-carbohydrate material and its effect on the fine vascular structures may be primarily responsible for the impaired intestinal absorption, which often attends Whipple’s disease. Although the apparently normal ultrastructure of the intestinal epithelial cells in our 3 cases by no means excludes a functional defect, the facts that these epithelial cells are morphologically intact and that none of the abnormal material has been observed within these cells lend credence to the suggestion that the absorptive defect in Whipple’s disease lies with the lamina propria rather than in the epithelium. From the general appearance of the vacuolated, cylindrical bodies in electron micrographs, and from the suggestion of their having at least some sort of internal organization, one must also theorize that the bodies could be of the nature of bacteria within the lamina propria. In this event the SPC cells of the disease could be carrying out some phagocytizing function. Certainly, a complete understanding of this fascinating disease is only beginning.

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As part of a wider investigation of tactoids, it becomes desirable to determine the dimensions and structure of tactoids of $\beta$-FeOOH and of the microcrystals composing them. The crystals were prepared by a slow hydrolysis of a variety of controlled solution concentrations of FeCl$_3$. Particle distribution measurements showed that the mean length of the crystals decreased with initial FeCl$_3$ concentration. There was evidence from the plot of concentrations versus axial ratios for simultaneous growth changes in all three axial directions. Methods of shadow casting indicated that the microcrystals might be square on cross section. Ultrathin sectioning of the crystals for electron microscopy supported this conclusion and showed that the crystals were present in cubic packing. Both longitudinal and cross sections showed a laminar structure within the microcrystals. The structural dimensions were the order of 35 Angstrom units. X-ray diffraction analysis showed the same pattern for $\beta$-FeOOH whether mounted on a dry powder or within the embedding material for sectioning.

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