lated, since creatinine excretion was found to be constant.

The data presented in Table 1 show that leukemic mice excrete large amounts of creatine compared to control mice of the same strain. Creatinine excretion was not significantly different between the two groups, nor was the content of muscle creatine.

Typical results obtained by daily measurement of creatine and allantoin excretion by leukemic mice are presented in Fig. 1. The average survival time after blood transfer was 10–12 days. It may be seen that, beginning about 8 days after blood transfer, there was a marked increase in creatine/creatinine and allantoin/creatinine ratios. Elevated allantoin excretion occurring during leukemia is not a new finding. The elevated creatine excretion occurring during leukemia in these mice quite probably reflects an increased synthesis of creatine, since the content of muscle creatine was not significantly different between the two groups and there was not a net weight loss. These results in conjunction with those previously cited (*1–3*) suggest that creatine may play a significant role in white blood cell formation.

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Comments and Communications

Science Education as an Ambassador of Good Will

THE exchange of educational facilities with some of our Latin-American neighbors, which has received active support through various exchange fellowship and professorship programs, has reached the point where some of the reactions of our colleagues to existing arrangements may be evaluated. The author has discussed the problem both with prominent educators, such as the presidents, deans, and professors at various South and Central American universities, and with students who were actual or potential candidates for such exchanges. Although it is not possible to present the entire picture in one brief note, a few of the reactions are worth reporting.

The vast majority of persons agreed wholeheartedly with the major premise—namely, that great benefits could accrue to Latin America through the wider dissemination of technical education and information. The questions revolve around the best means of attaining this end, and we shall review some of the pertinent considerations that were pointed out by our Latin colleagues, not all of which are fully appreciated in the northern countries.

First must be stressed the need for a broad technical education rather than a too-narrow specialization. It does no good to train a man to be an expert in the use of a particular instrument if no instruments of this type exist in his homeland; or to be an outstanding authority on a disease that occurs but rarely in his community. Yet, in the U. S. our tendency is to specialize and to reward the specialist. Thus, in graduate training particularly, a grave responsibility rests on the officer in charge, to avoid the temptation to assign one more graduate student to an intricate discipline, of which very few units exist in the entire world. The more valuable training would consist in a broad background in the subject, in the methodology of research, and in self-sufficiency and improvisation to build the necessary apparatus out of parts locally obtainable. It is always a temptation to draw ready-made equipment from the stock room, but this procedure is clearly undesirable when ready-made equipment would have to be purchased abroad at a considerable national sacrifice in foreign exchange. The success of the various European nations in making very complex apparatus and, indeed, in starting small industries is encouraging in this regard. We may cite Sweden as an example with a population of approximately 6,900,000 persons—less than that of greater New York—which has its own electronics industry, and which has constructed a large cyclotron almost entirely out of Swedish parts and materials.

The many advantages in sending students from Latin America to U. S. schools need hardly be catalogued; they can receive good training at many centers. The disadvantages to the Latin nations must also be considered. All too often the best students stay in the U. S., where they find good employment opportunities. This results in a gain to the U. S., but a larger loss percentagewise to the country that sent the students. The loss is doubly great if the country had to dip into its supply of foreign exchange to finance the fellowships. The second disadvantage has already been cited. U. S. tendencies in graduate training are commonly so specialized as to prepare a man better to be part of a complex entity here than to take the lead in the less technically advanced situation in his own country.

Exchange professorships, which are so successful among technically advanced countries, run into a serious drawback: What is there that can be offered in exchange? Seldom will a Latin country have a good technically trained professor to offer, but we might urge that professors of Spanish be occasionally sent, for this language is often taught in the U. S. by persons with atrocious accents and with no knowledge

of South American usages, insofar as they differ from those of Spain.

The chief objective of exchange programs can be achieved by sending more Spanish-speaking American professors to Latin America than has thus far been done. Professors in almost any technical subject, the sciences or engineering, are especially welcome. The person selected should speak Spanish; or if he does not, he should be willing to learn. Although almost all educated Latins speak several languages, the possibility of getting education across to students is far greater in the professor's poor Spanish than in English, which is too imperfectly comprehended. The financial problems in such a program do not seem to be insuperable. American universities have in the main generous policies regarding leaves, sabbaticals, or retirements. American professors could augment their leave, sabbatical, or retirement allowances by payments for a part-time teaching load in South America, where living costs are generally less. If, to this, could be added grants from the State Department, Unesco, or private organizations, a very considerable visiting professorship program could be activated. At present, it is most effective if the individual professor makes direct arrangements with the university in the country he considers the most interesting. When conducting such negotiations, the American should bear in mind that, although a given country can be generous in the salary it may offer, it may be difficult to secure any appreciable number of dollars, even to the extent of paying for an international air ticket.

The Latin-American universities urgently need technical books, journals, and other publications. Before World War II, large numbers of European books—mainly French and German, and occasionally English—found their way to the shelves of South and Central American libraries. They cost less than American publications. Today this source has largely dried up, and yet American books are still as expensive as ever, or more so. An American text, costing $7.00 to $9.00 U. S., by the time shipping costs are paid and the resultant sum is translated into a currency that has perhaps depreciated to one third its prewar value, becomes an impossible burden for the library and the student alike. In the meantime, the total quantity of technical information has so greatly increased that new books on every phase of technology are constantly appearing. The resulting gap in the book and journal situation in Latin America has greatly enhanced the difficulties in setting up adequate technical training programs. A tremendous market awaits the enterprising firm or individual who can find an inexpensive way of supplying the demand for technical books, journals, and other publications.

In the meantime, it is to be hoped that free lists will be expanded, that exchanges will be activated, and that individuals in charge of book distributions will realize that a great need, amounting to an acute hunger, for such books exists. It is further to be hoped that, in making up gift or exchange lists, not merely the few large universities at populous centers be included, but also the smaller provincial universities as well. The latter are often more concerned with education and less with politics than certain of the larger institutions.

Finally, it may be hoped that further distributional activities will be undertaken by the State Department or Unesco. The value to the countries receiving such exchanges or gifts is enormous, and from a purely selfish viewpoint, the value to the United States will be incalculable, not only as a gesture of good will but as first-class advertising. American texts describe American industrial products and equipment. What will be more natural than for an engineer or technical man, who desires to construct or buy a machine or piece of equipment, or to secure apparatus for a research project, than to order such items and parts as he has seen described in the books with which he is familiar? There seems little doubt that the cost of books distributed free or at a nominal price will be but a small fraction of the business that will accrue in the form of orders placed. Such was the European experience in the twenties and thirties, and it would indeed be a shortsighted policy if we were not ready to take advantage of the great technical awakening that is about to take place to the south of us. The author does not mean to encourage exploitation, but we should assist Latin-American nations in every way to achieve a technical proficiency that will help both them and us and that will, as has been so abundantly demonstrated, raise the standard of living of all countries concerned.

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The Glomerular Ram and Renal Water Absorption

CAPABLE physiologists and mathematicians have analyzed the hydrodynamics of renal blood flow and have been puzzled by the apparent deficit in pressure available to propel urine at the rates known to exist (BRODIE, T. G. *Harvey Lectures,* Ser. 5, 81 [1909]; WINTON, F. R. *Physiol. Revs.,* 17, 408 [1937]). D. Gomez, in the most sophisticated analysis (*Rev. sci.,* 3272, 451 [1947]), realized the importance of the elastic properties of the glomerulus but failed to grasp that it represents a coupled elastic ram, capable of elevating the pressure of glomerular filtrate as much as ten times that of the afferent arteriolar pressure by momentum transfer.

Such high pressures have been known to be extremely destructive in conventional hydraulic rams (ANDERSON, E. W. *Proc. Inst. Mech. Engrs.,* 1, 337 [1922]), and they may play a significant role in the destruction of tubular tissue in hypertension.

More interestingly, however, such high pressures afford a simple, self-regulating, and continuously variable control for water reabsorption in the nephron and explain many apparent paradoxes in clinical renal physiology. Complete solution of the equations, because of variable viscosity terms, requires analog