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

solution, now under way. The limits of the device are entirely dependent on the ratio of the as yet unknown elastic constants of the glomerulus, whose direct measurement is now being attacked.

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Science and the Bible

SCIENCE is not intended to be a forum for theological disputations. It is therefore most surprising and regrettable that valuable space was ceded to the comment by Cyrus N. Ray (SCIENCE, **113**, 610 [1951]). To a physician and scientist like myself, who is acquainted with Hebrew philology, as well as classical literature, that diatribe reveals an imperfect and prejudiced acquaintance with the Book of Books. His citation from Rev. 7: 1 is but a repetition of a well-known classical Hebrew expression found in three passages of the Hebrew Bible; namely, Isa. 11: 12, Isa. 24: 16, and Ezek. 7: 2. In each case the Hebrew term *Kanaf* is employed (pl., *Kanfoth*), which etymologically denotes "wing or wings," and the expresion *arba Kanfoth ha-aretz* refers not to the shape of the earth but to the four points or directions of the compass. By "four corners of the earth" is meant, as the Authorized Version correctly puts it, the "uttermost parts of the earth" or, as the Vulgate gives it, "four quarters of the earth" (Douay's translation).

The passage in Isa. 40: 22, so well quoted by Carl S. Wise (SCIENCE, **113**, 128 [1951]), is the clearest and the absolutely unequivocal Hebrew reference to the shape of the earth. The Hebrew *Hug* means a circle and refers to the round contour of the earth. Some Hebrew scholars interpret that verse as referring not only to the spherical shape of our planet, but also to the earth's orbit. The clause in the same verse (Isa. 40: 22) that reads, "And her inhabitants are like grasshoppers," in Hebrew does not refer to the small size of man in the eyes of God, who is all-seeing and omniscient. On the contrary, it describes with exquisite aptness the psychology of *Homo sapiens* by comparing him to the grasshoppers of the Bible. The characteristics of these creatures are delineated in three passages. In Joel, chapter 1, they are described as voracious and noisy. In Eccles. 11: 5, they are depicted as frequently dominated by overwhelming sex drives (the Hebrew *hagab* denotes *libido*; compare Rashi's commentary). In Num. 13: 33 they reveal an exaggerated inferiority complex (compare Midrash on Shir Hashirim).

Voluminous concordances and extensive commentaries have been written on the works of Shakespeare, Dante, Goethe, and other great writers. So have numerous concordances and commentaries and lexicons been devoted to the Tenach, or Hebrew Bible. Shall we deny the same homage and study, even from the purely literary point of view, to the universally acclaimed poets, prophets, philosophers, and preachers of the Holy Writ? The answer given by those men of science who have had sufficient breadth of vision and initiative to master the humanities along with their store of scientific lore, those men who live a three-dimensional life instead of the flat, two-dimensional one of the specialist, is unequivocal.

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Far Vision Observations

Two discussions of the limits of unaided human vision of topographical features at a distance of 13 miles, by Hirsch and Weymouth, and by Olmsted and Olmsted recently appeared in SCIENCE (**114**, 19 [1951]). The writer doubts the contention of Hirsch and Weymouth that "a cliff less than one foot in height could be recognized as a change in contour at a distance of thirteen miles." My field experience indicates that no such visual acuity exists under natural conditions.

My office windows in the Mims Building, Abilene, Texas, offer a vantage point from which objects may be viewed at a distance of 13 miles. Almost the whole south horizon is rimmed by escarpments of the Callahan Divide of the Edwards Plateau. One of these, Cedar Gap Mountain, rises 569 ft above Abilene, and on its top is a radio tower (KRBC) that rises an additional 456 ft. My position for observation is 80 ft above the street, and on clear days the radio tower may barely be seen like a very dim pencil line on paper. The radio tower has a bright sky background above and back of the mountain on which it stands, or it probably would be invisible at that distance.

The structure is composed of three steel rods, each 2 1/6 in. in diameter, set in triangular form, and joined by a lattice of short rods to form the tower, inside of which is a narrow metal ladder. Each of the three flat faces of the tower is 50 in. across. Evidently, at a distance the 50 in. of lattice have about the visual appearance of a solid of that size.

If this steel tower 456 ft tall and 50 in. wide can be only faintly seen as a dim pencil-like line against a brilliantly lighted sky at a distance of 13 miles, it seems improbable that an offset of one foot in an escarpment face would be visible at that distance.

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