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Cheever A W. A quantitative post-mortem study of schistosomiasis mansoni in man. *Amer. J. Trop. Med. Hyg.* 17:38-64, 1968.

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Hepatic pathology in Brazilians with schistosomiasis was related to the intensity of their *Schistosoma mansoni* infections when worm numbers recovered at autopsy were correlated with specific liver lesions. The number of eggs found in the feces was directly related to worm numbers thus validating fecal eggs as a measure of infection intensity in live patients. [The SC7® indicates that this paper has been cited in over 160 publications.]

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The pioneering studies of J. Allen Scott in 1938 demonstrated that passage of schistosome eggs in feces was steady despite the intravascular position of the worms<sup>1</sup> and suggested that egg numbers in the feces reflected infection intensity. In 1962 in a village in northeastern Brazil, Kurt Kloetzel correlated egg output in the feces with schistosomal liver disease,<sup>2</sup> but the work was largely ignored, perhaps partly because Kloetzel was as unconventional and controversial as he was incisive in his thinking. My experimental work at the National Institutes of Health (NIH), in association with Louis Olivier, Bill DeWitt, and Ken Warren, never led me to think of schistosomiasis in other than quantitative terms. I wished to relate disease directly to adult worms recovered at autopsy.

This study was conducted in Salvador, Bahia, Brazil—still a wonderful place to visit or work. I met Zilton Andrade, a pathologist from Bahia, in New York in 1959 while I was a resident at Mt. Sinai Hospital, and I resolved to learn the pathology of human schistosomiasis from him. Four years later I finished my pathology residency at the NIH, and the time was right. I also needed a research project, a secondary but important consideration. Since there was little hope of recovering worms at autopsy, my principal proposal instead became the study of hepatic vascular changes in severe schisto-

somiasis, an "old" interest of mine but not a novel project.

Thomas Weller had kindled my interest in schistosomiasis when I was a medical student, and I had done research as a resident in addition to two years with the National Institute of Allergy and Infectious Diseases. The NIH was not entirely uninterested in my proposed overseas gambit but reasoned that I needed seasoning before heading into the field. I disagreed, and, with the encouragement of Harold Stewart at the National Cancer Institute, I applied for and received an Eleanor Roosevelt Cancer Research Fellowship to work with Andrade in Bahia. The NIH hired me shortly before I left, greatly facilitating the work in Bahia.

Andrade, his staff, and clinicians at the hospital were hospitable, patient, helpful, and knowledgeable. Techniques for worm recovery progressed rapidly, and I put my casts of liver vessels aside and concentrated on correlating worm numbers with disease and with schistosome eggs in tissues and feces. Eggs in tissue caused the disease, and the number of worms and tissue eggs were related to each other and to disease. Fecal eggs were the link between the cadavers and Kloetzel's villagers. Eggs in feces did indeed reflect numbers of worms, providing direct confirmation of Scott's hypothesis and thus supporting Kloetzel's conclusions as well. Reanalysis of the original data has recently confirmed the relation between worm numbers and fecal eggs.<sup>3</sup>

Most clinical field studies have shown disease to be correlated with fecal eggs,<sup>4</sup> and there is now general agreement that disease caused by schistosomes is related to infection intensity. Kloetzel's proposal for prevention of disease by periodic treatment of heavily infected individuals<sup>5</sup> remains a mainstay of disease control.<sup>6</sup>

Some finality is often attributed to the pathologist's conclusions, and with worms in hand I may have seemed convincing. This result combined with accumulating clinical evidence confirming the importance of infection intensity in gauging the severity of schistosomal disease perhaps accounts for the frequent citation of this work.

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3. Singer B, Lumey L H & Vermund S H. Statistical scrutiny of density dependent fecundity of *Schistosoma mansoni* in man. *Nature*. (In press.)
4. Sleight A C, Hoff R, Mota E A, Sherlock I, Mott K E, Barreto M L, Maguire J H & Weller T H. Three-year prospective study of the evolution of Manson's schistosomiasis in northeast Brazil. *Lancet* 2:63-6, 1985.
5. Kloetzel K. A suggestion for the prevention of severe clinical forms of schistosomiasis mansoni. *Bull. WHO* 37:686-7, 1967.
6. Sleight A C, Mott K E, Hoff R, Maguire J H & da Franca Silva J T. Manson's schistosomiasis in Brazil: 11-year evaluation of successful disease control with oxamniquine. *Lancet* 1:635-7, 1986.