single most cited paper were taken away. And yet, and yet . . . looking down the register of the *Nobel Class,* we see amongst the Nobel laureates and aspirants the names (I would have thought by common consent) of some of the choicest noodles in all of science, as well as some striking absences (not a Huxley in sight for example); presumably some of these operate in sparsely populated fields, or then again perhaps, as Chargaff has suggested, it is less important to be first than to be last. Garfield himself quotes a testy letter from an illustrious virologist, to the effect that his *Citation Classic* (another of Garfield's coinages) is one of his less significant accomplishments, being cited exclusively for the procedure that it contains for washing and suspending bentonite clay, which is used as a nuclease inhibitor.

All the same, whatever one's (wholly subjective) reservations, Dr Garfield's statistics afford a unique panorama of science in action, and many a diverting insight into the intimate habits of its practitioners. The refinements of authorship are particularly rewarding. We learn for example that with success comes a modicum of generosity: Nobel laureates, once the bacon is safely home, tend to yield priority to their co-workers in the listing of authors. An examination of papers published in the *Journal of Physiology,* which as a matter of editorial policy places authors' names in alphabetical order, reveals that Professors with names such as Zweig, or those who have graduate students called Aardvark, take their business elsewhere. Indeed the citation-watchers, such as Professor Derek de Solla Price, have, it appears, been much exercised about how to apportion credit for authorship: should the first author be entitled to store up more riches in heaven than the second or the twenty-second? Should one receive equal benison for a share in a thirty-author bone-crusher of the kind common in particle physics, as for a solo effort? The experts, you will be relieved to hear, are working on it.

The scope of Dr Garfield's writings transcends the work of ISI, however. When Charles Dickens received as a contribution to the literary magazine, of which he was editor, a set of poems with the title "Orient pearls at random strung" he sent it back with the scribbled comment, "too much string". There is, to be sure, a certain amount of string in Dr Garfield's latest anthology, but overall he gives excellent value. His organization has endowed prizes and sponsored local artists; he writes pleasantly about these enthusiasms, and his dissertations on such subjects as risk assessment, and most of all on medical matters, are at times quite transfixing. His book is worth the money just for his accounts of those three arguments against the existence of God, acne, halitosis and venereal trichonomiasis. One looks forward to more in the same vein anon. □

Walter Gratzer is in the Medical Research Council Cell Biophysics Unit, King's College, London.

Metals on the brain

Laszlo Magos

Neurobiology of the Trace Elements (in two volumes).
Edited by Ivor E. Dreosti and Richard M. Smith.
Humana: 1983. Vol.1 pp. 374, Vol.2 pp.320. Each volume $49.50 (US), $59.50 (elsewhere).

THE title of this work refers to trace elements, but it is not without significance that only one chapter in the two books deals with an element which is not metal or metalloid. The first volume is dedicated to *Trace Element Neurobiology and Deficiencies,* the second to *Neurotoxicology and Neuropharmacology*; neuropharmacology, however, is represented by a single contribution only.

Though there are many common targets for essential and toxic metals — for example catecholamine metabolism for copper and manganese, or hippocampus for zinc, lead and trimethyltin — market research probably indicated that interest in one volume would frequently exclude interest in the other. As evidence of this, both volumes have the same foreword, preface and conclusions. As a toxicologist I cannot agree with the assumption — I found the first volume more cohesive, comprehensive and altogether better reading. One has the impression that the editors, with experience in trace metal deficiencies, were better equipped to conduct the authors of the first volume to play in concert but did not influence the authors of the second to the same extent. Moreover the correction of inconsistencies in the chapter on manganese in Vol.2 (for example when absorption is described) would have greatly improved this contribution.

In the first volume there are two chapters on copper, three on zinc and single chapters covering iodine, iron, selenium and cobalamine. There is very little repetition when more than one chapter is dedicated to the same metal. The authors balance well biochemistry, pathology, clinical and experimental investigations, and amalgamate diverse knowledge effortlessly, putting the main emphasis on developmental neurobiology.

The second volume has an excellent chapter on mercury, but this account is rather narrow in scope being restricted to the effects of methylmercury on the fetal brain. The hiatus is filled by a contribution on the behavioural toxicology of heavy metals, which, in addition to covering behavioural effects, concisely describes the neurotoxicity of methylmercury, metallic mercury and lead, and at least mentions arsenic and organotins. Given the effect of trimethyltin on the hippocampus, however, a chapter on these compounds should have been included. The rest of Vol.2 contains two chapters on cadmium and three on lead, with manganese, aluminium and lithium each being represented by single chapters. Though the teratogenecity of zinc deficiency is described in the first volume in detail, and the protective effect of zinc against the teratogenecity of cadmium in the second volume, it is not mentioned that cadmium inhibites the placental transport of zinc. Nevertheless the defects of the second book are relatively minor and it mainly suffers from comparison with Vol. 1.

Researchers in fields related to the neurobiology or neurotoxicology of trace metals will probably find, as I did, the reading of this not unusually expensive work to be rewarding. Beyond the information supplied, the quality of paper is excellent, the typography is clear and pleasant, and references, complete with titles, are plentiful and are arranged in alphabetical order at the end of the chapters. Both volumes are supplied with good indexes. □

Laszlo Magos is in the Medical Research Council Toxicology Unit, Carshalton, Surrey.