From the present attitude, coupled with the damage that was done in the last war, we can be reasonably certain that they would not hesitate to put us on the road to scientific suicide.

RESERVIST
(*Name withheld by request*)

## Microfilm Publication

I AM very much concerned about the petition submitted by the two committees on zoological nomenclature to the International Commission on Zoological Nomenclature reported in SCIENCE (**113**, 466 [1951]).

I think these committees have taken an extremely narrow point of view on a subject of great importance to both zoological and botanical nomenclature. The acknowledged shortage of publication space and cost of letterpress, lithoprint, etc., types of publication alone make it imperative that *every type* of publication that is readily available to the public be considered as a legitimate place of "publication" for taxonomic entities.

The paper cited cannot be used as an argument for their petition, for it is only an argument against the waste of money on republishing a paper already effectively published and available to anyone desiring it.

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## Nondiffusibility of Alkaline Phosphatase in Fixed Tissue

DR. NOVIKOFF'S intensive examination of the histochemical tests for alkaline phosphatase (*Science,* **113**, 320 [1951]) still leaves unanswered the question of whether the enzyme itself diffuses. That the enzyme does not diffuse during incubation of sections in aqueous medium at pH 9.4 can be shown by a simple test that, to my knowledge, has not appeared in the literature. In this laboratory we have made the test on sets of five slides of mouse duodenum, which are treated as follows:

1) A slide is incubated in standard Gomori medium at 38° for 5 sec. Appropriate further treatment then reveals a dense black precipitate in the striated border, but no sign of activity anywhere else.

2) Another slide is incubated in the medium for 30 min. After conversion of the precipitated calcium phosphate to cobalt sulfide, the entire section appears blackened, with a gradient of darkness extending away from the striated border through the epithelial cells, the intravilline stroma, and the mucosa and musculature. The Golgi bodies are darker than the rest of the cytoplasm. The picture certainly suggests diffusion from the border into inactive material.

3) Three other slides are incubated in barbital buffer (pH 9.4) at 38° for 30 min, and are then placed in buffer-substrate medium for 5, 15, and 30 sec. The pictures obtained after this treatment are the same as in case 1, with the precipitate being strictly limited to the striated border. There was no evidence of diffusion beyond the border, nor was there any apparent loss of enzymatic activity such as Yokoyama, Stowell, and Mathews (*Anat. Record,* 109, 139 [1951]) observed under somewhat similar conditions.

Of course these results do not bear on the possibility that alkaline phosphatase diffuses during fixation. They do, however, show that highly concentrated phosphatase does not alter its position in fixed and mounted sections kept in fluid medium at incubating temperature for as long as ½ hr. This finding is in agreement with Dr. Novikoff's demonstrations that it is possible for calcium phosphate to diffuse and be absorbed at false localizations in mounted sections.

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## Sui Generis

I READ with interest J. R. Pierce's article on "Science and Literature" in your issue of April 20, but I would like to point out one omission in it. He spoke of a book by Heinlein, tracing the imaginary future of man through many periods but omitted to mention what, in my opinion, is by far the best book on this subject, namely, Olaf Stapledon's *Last and First Men.* This pursued the subject in a most illuminating way, on the assumption that with the vast amount of time still ahead of the human species, it might well produce a succession of totally different types. Stapledon's picture of the society in which all the thinking was done by specialized individuals whose brains were cultured out to a gigantic size on some sort of trellis, is unforgettable!

JULIAN S. HUXLEY
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## A Note to the Department of Internal Revenue

THE appearance of the comments on "Scholars and the Root of All Evil" in SCIENCE (**113**, 330 [1951]) on March 23, at a time when scholars along with the rest of the tax-paying public were emerging from the annual struggle with income tax returns, started a trail of thought that poses another point for public attention. In reading the comments in SCIENCE we were confronted with Bauer's formula for deriving an approximately just and fair income for the scientist or scholar who has invested many years of his youth, many dollars of a then nonexistent income, many IQ points of mental capacity, and unbounded personal energy and zeal in preparing his mental equipment for lifetime service.

In making out the federal income tax return we noted the possible channels open to the businessman who also has invested money in ideas but who, on the other hand, has transmitted his investment into material things: buildings, equipment, inventories, etc., against which, in time, the government will allow a proportionate mark-off under a heading on page 2 called "depreciation." By putting the two investments in juxtaposition, the reader discovers that for the learned man, the one who has salted away his money and time and effort and ability in his "brains"—in

mental rather than material equipment—unlike the businessman, there is allowed no deduction for "depreciation."

Yet consider how definitely for some—though less perceptibly but still as surely for others—often how suddenly, the economic returns on the scholar's mental equipment terminate when his professional life becomes "depreciated" on retirement! Directly or indirectly, after a lifetime of study, of labor, of devotion to work, of repeated expenditures for scholarly "education"—the tools of the scholar's trade—the economic returns stop! Yet there is no allowance for him on page 2 under "depreciation"! Match this with the consideration given the nonacademic businessman just around the corner or down the street!

I am therefore adding this note to the current comments: Let mathematically inclined men like Dr. Bauer continue to work out a formula for a fair return on a man's professional and scientific investment, but let them also work out another formula, one that will enable the scholar's big educational investment to get recognition on the federal and state income tax returns in terms of deductions from the total capital outlay!

And then have the AAAS present the formula, with the full backing of all American scientists, to the Department of Internal Revenue, or to the legislators who make the laws controlling the workings of the Department of Internal Revenue, and have some effort made to get for scholars a break similar to that given businessmen.

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## Observations on Purine Metabolism

IT IS possible that investigators in the past have placed undue emphasis on the integrity of the purine ring once it is formed. This consideration applies both to the utilization of exogenous purines and to the conversion of adenine and 2,6-diaminopurine to guanine. The evidence that has been put forth to support the retention of the intact ring system (*1, 2*) shows, on closer inspection, that ring opening may have taken place. Indeed in one case the latter hypothesis is supported by the very evidence cited to disprove ring opening (*2*).

In the first case (*1*) the guanine isolated from the rat viscera after feeding 1,3-$N^{15}$-adenine was degraded to xanthine and guanidine, and it was shown that all the isotope was retained in the 1- and 3-positions. These results do not rule out the possibility of ring opening between the 1- and 3-positions, or in the imidazole ring. In the second case cited (*2*), 2,6-diaminopurine was fed to rats in two different experiments and the guanine isolated from the rat nucleic acids. In the first diaminopurine experiment the purine was labeled in the 1- and 3-positions and in the 2-amino group with $N^{15}$, and of the guanine isolated 4.0% had been synthesized from dietary 2.6-diaminopurine. (At this point a degradation of the isolated guanine to xanthine would have been of interest.) In the second diaminopurine experiment, the purine was labeled with $C^{13}$ in the 2-position, and the guanine isolated contained only 1.5% of isotopically labeled molecules (based on the administered diaminopurine as 100). No explanation for this difference was given, but the $C^{13}$-guanine was degraded to guanidine, which was shown to contain 85% of the isotope present in the guanine. This result was cited to show extensive retention of the ring system. Actually it shows, first, that the 2-carbon of 2,6-diaminopurine is biologically labile, and the pyrimidine ring must therefore open, and, second, that an appreciable amount of isotope seems to be reincorporated. This reincorporation may well be at the 8-position, and if this is the case the imidazole ring as well must be opened and recyclized during the interconversions, possibly during riboside formation. Feeding experiments with 8-labeled adenine are under way to test the possibility of the imidazole ring being opened and recyclized during incorporation of the purine.

There is a great deal of other scattered evidence in the literature which points to the possibility of a complex path for the incorporation of exogenous purines, as well as for the *in vivo* interconversions among the purines. The limited incorporation of guanine (*1, 3*), hypoxanthine (*4*), xanthine (*4*), and uric acid (*5*) into mammalian nucleic acids is illustrative of the poor utilization of preformed purines. Further, the participation of a ring-opened intermediate in microbial metabolism, as well as in mammalian, is indicated by the fact that the inhibition of growth by antifolics is reversed only by large amounts of preformed purines, if at all, even though folic acid is certain to be importantly involved in purine metabolism (*6, 7*).

These matters are of importance since the design of suitable purine antagonists as tumor-inhibiting agents has been the goal of a number of investigators (*8–10*). If our hypothesis is correct, the synthesis of purine analogs containing intact rings may be a less fruitful line of research than the preparation of suitable open chain or monocyclic compounds, perhaps conjugated with formylfolic acid (as a Schiff base), with ribose, or with both.

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