Comments and Communications

Scholars and the Root of All Evil

THE letter published by R. P. Boas, Jr., in the November 3 issue of SCIENCE, under the title "The Payment of the Learned Man," is very thought-provoking. The first questions that come to mind are, How did all this come about? and, What can be done about it?

Not being a historian, my facts may be inaccurate; but my impression is that the early German university was a richly endowed institution where investigative men were cloistered so they could spend their lives undisturbed making contributions to knowledge as an end in itself. Life outside this institution was harsh, and the men inside disdained it. But times have changed; life outside is more attractive now. . . .

This brings us to the second question. Little can be done to change the institution; for, once established, any institution tends to remain unchanged, even when faced with extinction. And the scholar is still tied closely to an institution patterned after the German university.

Scholars could, conceivably, organize and enforce demands upon universities for better pay. Inasmuch as such action runs counter to the social heritage of both the scholar and the university, two great difficulties stand in the way of this solution. One is the difficulty in persuading scholars to organize, the other is the difficulty in enforcing demands. The extent of this latter difficulty can be judged by the success with which demands of scholars for better tenure have been met.

So it is that a dissatisfied scholar's only recourse is to sever his connection with the institution that traditionally harbored him, to engage in professional rather than scholarly activities, and to practice for a fee. The pattern has been set by law and medicine. Two prerequisites must be met: a strong professional organization and legal recognition of the profession.

This suggested solution to the problem of adequate pay for the learned man is not without difficulties. Chief among these is the failure of all persons concerned to recognize clearly the distinction between a learned society and a professional organization. Psychologists have already discovered that a learned society cannot serve adequately the needs of a profession. They have not yet discovered whether a professional organization can serve the needs of scholars. They are now in the process of discovering whether a hybrid organization can adequately serve the purposes both of a learned society and of a profession. Some of the difficulties arising from this source are well illustrated in a recent report to the American Psychological Association by its executive secretary (*Am. Psychol.*, 5, 522 [1950]).

The problem of adequate pay for the learned man merits serious study and positive action by all of us. Perhaps the first action needed is to make sure that the problem itself is more generally recognized.

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THE letter of E. Bodewig has probably aroused considerable interest. I suggest that some may not have agreed with his closing sentence, "The scholars would agree with me." In the course of my academic pursuits in three universities, I associated with some learned men who professed to believe (and treated their assistants and graduate students in a manner consistent with such a belief) that scholarly achievement is accomplished *only* by men working under the stress of monetary insufficiency. I heard the comment that the church-mouse graduate student or fellow *invariably* outperforms the student with ample funds.

This is a ridiculous assertion. For well-grounded experimental scientists to wander so far from the path of straight thinking is amazing. No such relationship between students or scholars and money has yet been established experimentally.

Many fine minds have been lost by the world of scholarship because its monetary rewards are so poor. Within the field of medicine there are numerous research branches in which learned men pursue their studies with rewards no greater than those of which Dr. Bodewig complained. The clinical practitioners must be considered separately. The doctors in medical research who receive no fees from patients comprise a group of whom many work as long and as hard as the mathematician and receive far less per hour or per year than the bricklayer to whom Bodewig referred.

There are fashions in medical research. Scientists who affiliate themselves with an institution that is devoted to a currently fashionable branch of medical research will seem to be exceptions to the statement in my preceding paragraph. Even there, monetary returns will be inadequate for the majority of the professional personnel.

I'd like Dr. Bodewig to set his mathematical talents to the task of calculating an hourly rate for learned men. He has financial knowledge and the proper interest in scholars, so that he might properly be considered suited to the task. I propose that the calculations might be derived somewhat as follows.

1. Suppose the average high-school graduate earns D dollars during his first year of work after high school. Meanwhile the future scholar is *not* earning, but is spending S dollars for tuition and living expenses for his first year at the university. At the end of the scholar's first university year, he has invested $S+D$ dollars in training for his future scholarly endeavors.

2. For the second year of work, the high-school graduate earns D plus x dollars. The scholar spends (often money which is borrowed at interest) $S \pm x$ dollars.

3. At the end of 8 (or 10 or 12, etc.) years of post-high-school training, the scholar has invested $D + (D + x) + (D +)$ etc., in addition to $S + (S \pm x) + (S \pm y)$, etc., at compound interest.

4. The scholar, therefore, should be entitled to a sum represented by the current earnings of the high-school graduate 8 (or 10 or 12, etc.) years after high school, plus an amount calculated to return to him his entire investment with reasonable interest—and within the period of his normal life expectancy.

Have we a right to ask less for our learned men?

I realize that my proposal omits any consideration of the source of such funds with which to pay the scholars. Indeed, there are innumerable questions to plague any who would venture to support Bodewig in his proposal that scholarship be lifted at least to the level of remuneration of ordinary skilled labor.

There still remains a place in this world for selfless labor, asceticism, and devotion to, or dedication of, one's life to art, science, or humanity. Nevertheless, it would be very fine indeed if some group were to study the problem and reach a satisfactory answer for raising the standard of living of scholars. I personally believe much excellent work has been done *despite* penury and not because of it. A well-fed, well-clothed, well-housed scholar is just as likely to do good work as a well-paid lawyer, government employee, or bricklayer.

DONALD BAUER

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I READ with much interest R. P. Boas' letter from his colleague, E. Bodewig. I hope that SCIENCE will publish many letters on this subject because he raises a serious problem, and every one of us probably can offer examples, case histories, and observations, pro and con, similar to his. It is a situation that hurts our profession. The problem starts with our kindergarten teachers and is not relieved until our most eminent scientist dies. Why do we allow ourselves to be herded like cattle and accept what our politician friends are willing to give us? Do we have too much brains for our own good? Are we as a profession too proud to demand more? Or are we so busy attending to our own business that we forget that we must keep body and soul together?

I know what the answers will be. With such a volume of brains concerned—and I might say, high-quality brains—there will be much disagreement. We have another group in the same fix, the farmer, on whom we all depend for our food supply. He is not in a mood to organize for his own good, either. So the farmer, the scientist, the schoolteacher, and a few others have stood by while labor has set the pace. The only exception is that the Federal government has stepped in and through subsidy has improved the farmer's status.

I admire labor because through organization and cooperative effort it is possible for the laborer to collect a parity wage for 8 hours of work and actually do only 5–6 hours of labor. It has also made it possible for an average skilled laborer to label himself a carpenter or mason, do less than an average job, and get top pay. And many do this, I am told, because sometime during the past 20 years they have got the idea as a result of working in our service organizations.

Our problem as teachers and scientists is one of supply and demand. If a person can be hired for $25 a week, and there are plenty willing to work for that, why pay more? That is the idea of most school boards. I served with eight other members for 9 years trying to change this idea, but my efforts went for naught until we gradually displaced conservatives with progressives on the board.

We hire assistants in college teaching for $50–$75 a month, and I am ashamed to say they carry a big share of the load. This has been going on so long that college budgets are fitted to that level of pay. They are in a rut, and I doubt whether many ever will get out of it. A few have. I know one administrator who told his budget commission that he needed a certain amount of money for a certain number of students and that, if he couldn't accommodate the students on that basis, they would have to go somewhere else. He didn't get fired and he got more money to pay his men. Too few of our administrators will take such a stand. . . .

There is too little emphasis given to ability of personnel. In our whole setup from grades to college we have people who have been exposed to sufficient college tenure to satisfy requirements. They get into teaching or research because it is the easiest path to a job. Once in, it takes a hard-boiled administrator to go before a civil service board and prefer charges of incompetence.

Personally, I feel that I, as well as my staff, am underpaid. But if I had to start over again, I doubt whether I would do anything different. I like my work. I have been in commercial, teaching, research, and administrative work . . . and I would think very seriously about a different type of job even though it paid twice as much. I believe many of our leading scientists feel that they would prefer to be in the position they are in even at near-starvation wages. And yet it is a pathetic situation.

There is much criticism against a scientist taking work on the outside. Personally, I feel that I have no right to an employe's time except the 40 hours per week that I require. What he does on his own time doesn't concern me, as long as it doesn't interfere with the 40 hours he owes me.

When we do additional work for others, we are pikers if we work for nothing. I once wrote a treatise for a concern and received $500. The company spent $90,000 on a publication involving the treatise for which I received $500. Yes, Dr. Bodewig has much to talk about, and most of us will agree with him, but in the long run who is to blame? If we are willing to work for a pittance, it is our own fault because, if I drop out, I know that someone probably better fitted

is ready to take my place. We still haven't got away from the old-fashioned–schoolteacher days when compensation consisted of living with the neighbors. Academically, perhaps the UN should consider it. Practically, it is our own problem to solve.

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THE communication of E. Bodewig on "The Payment of the Learned Man" sent to SCIENCE (**112**, 538 [1950]) by R. P. Boas, Jr., is a propagandistic statement. As such it should not remain unchallenged.

There is no quarrel with the thesis that a scholar should receive appropriate compensation for his work. Yet Dr. Bodewig has based his case on selected statistics, colored by emotions. There is no proof that scientists as a group fare worse in their incomes in comparison with physicians and lawyers. In the top levels there may be some differences. Even there scientific men of outstanding caliber receive salaries and consulting fees of the same order of magnitude as those of other professional men, especially if expenses for offices, staff, and services required by physicians and lawyers are taken into consideration. This theme cannot be adequately covered in the limited space of a letter. The question of compensation for abstracting work, however, which prompted Dr. Bodewig's blast, needs some scrutiny.

The scientific literature in various fields is growing continually. The abstracting journals fulfill a most useful purpose in helping scientists to keep abreast of the flood of publications. How long could anyone maintain his level of knowledge without such a service? How much extra work would a scientist undertake without being aware of what others are doing? Hence, how could he maintain his competitive position, which enables him to earn his keep? The contributions a scientist writes for the abstracting journals, usually without monetary recompense, pay off by keeping him better informed. For the few articles anyone abstracts, he receives the digests of papers by many others. It is a cooperative effort that enables a scientist to remain up to date. For these journals he does not have to pay as large sums as physicians have to pay for refresher courses, or as lawyers, who have to pay substantial amounts for digests of court decisions. Nor does he lose any pay from the job in which he earns his livelihood. No university or laboratory will deduct anything from his salary if he uses some of his time to prepare abstracts; in fact, this activity is in many places a recognized phase of a scientist's job.

Scientific work is a calling such as the ministry or teaching, where satisfaction in the work is as important as monetary compensation. Besides, knowledge is one thing no one can take away from you. It will sooner or later find its own remuneration. But the businessmen who make the millions in one morning (who are they, and how many of them are there, Dr. Bodewig?) can lose them just as readily the next day. But perhaps I agree with Dr. Bodewig that, when science ceases to be an avocation, it is time to quit.

H. E. LANDSBERG

Research and Development Board
Washington, D. C.

IS Dr. Bodewig's letter in the November 3 issue an index of the current German intellectual outlook? No doubt many other of your readers are also wondering how it solves the problem to have a man of independent means abandon scholarship because it has so little financial reward. I am grateful for little successes in the stock market because that enables me to do independent research—not abandon it. Dr. Bodewig's views of business are somewhat amusing; I would like to know more about the system by which the businessman frequently makes 6 million gulden by two or three telephone calls. Whom do I call, please? Dr. Bodewig is glad that he is not unworldly like other scholars—perhaps your translator had trouble with whatever the German word is for "unworldly." I wonder what Dr. Bodewig's real reason is.

NORMAN J. HOLTER

Helena, Montana

Lament of a Moneyed Man

DEAR SIR:

I am one of the men who consecrate their lives to making money. I feel that we do not get a square deal. The majority of my fellow-sufferers do not realize it because they are not sufficiently familiar with the "world" outside the confines of the business world, but my family connections brought me in contact with scientists and other daydreamers, and, by gosh, they do get fantastic discounts.

Fortunately, we in America don't name streets after scientists, but I saw a Helmholtzstrasse in Germany and a Rue Pierre Curie in France. Now these fellows (Helmholtz and Curie) were plain university professors who, in all their lives, saved perhaps $1,000 apiece (after adjusting to our present costs of living). This ridiculous sum of money was sufficient to secure street names for them. My capital is 1,000 times as great. How many streets are named after me (or my colleagues in Germany and France)? Exactly none.

There is a Faraday Society in Britain, a Bunsen Gesellschaft in Germany, and Linnean societies in several countries. I am sure I accumulated more money than Faraday, Bunsen, Linnaeus, and many other celebrities taken together, but no society honors itself by inscribing my name on its banner. There is a Hall of Fame in New York City. Recently, a bust of J. W. Gibbs was placed in it. No doubt I earn more money in one week than Gibbs (just a professor at Yale) earned in a year. If the Hall of Fame contains a bust of Gibbs, it should contain at least 52 busts of me. And how many does it actually contain? Precisely none.

We are maltreated not only in comparison with

scientists. A boy called Keats once lived in England. He was junior salesman in a drugstore and held even this humble position for a short time only, as he died quite young. I think my earnings for one week, perhaps for one day, are greater than all the wages ever paid to Keats. But people (especially young people) learn his poetry without compulsion and when they recite it their hearts throb, their voices quaver, and their faces flush. Theses are prepared on Keats, and books are published on Keats, but not on me. If every business letter that I have dictated, and by which I gained as much money or more than all Keats' wages, had brought me as much love and admiration as Keats' writings brought to him, then. . . . And how much love and admiration did I win? None.

"Fortunately, none" would be the right expression because many moneyed men get less than nothing (in scientific language: a negative amount). During the recent preelection campaign, some candidates were accused of friendship with gambling kings. Friendship with a man who has more money than all the poets and mathematicians of the nation together appears as a crime in the eyes of the "world."

I am fed up. I strike. I quit money-making for purest scientific endeavor. Have you any suggestion as to what I should discover first?

Yours very truly,

A MONEYED MAN

(*Name supplied on request*)

Woodside, Long Island, N. Y.

Alcohol Metabolism

BEERSTECHER has stated (*Science,* **112**, 312 [1950]) that establishment of a figure for maximal human consumption of ethyl alcohol has "many important implications in both medical and legal practice" and brought forth evidence which he felt invalidated our estimate of a quart of 100-proof liquor per day for a man of average weight (*Science,* **109**, 594 [1949]). He stated that he knew two persons who consumed substantially twice this amount over extended periods of time. One would like this sort of evidence presented in a more scientific manner before accepting it. It is quite true that a 70-kg man can consume more than the estimated amount in 24 hr; an additional 600 ml of 100-proof liquor would be required to bring his blood alcohol concentration up to 500 mg/100 ml, about the maximum tolerated by man. Thus in the first 24 hr his consumption could be close to 2 qts, but this would be cut to 1 on subsequent days.

That there may be a rare individual with an extremely efficient enzyme system for metabolizing alcohol cannot be denied, and our figures for both dogs and men show a considerable range; but even if the fastest rates of metabolism of alcohol that we have recorded are used, the quart a day remains a close approximation.

As to the concentration of alcohol our dogs were supplied with, namely 10%, being below the optimal for maximal consumption, we found that, if the concentration were raised to 20%, there was no actual increase in the amount of alcohol consumed; the dogs limited their fluid intake to avoid greater alcohol intake, with the result that their health was impaired by dehydration.

It is quite true that small animals, such as the rat and mouse, can metabolize greater amounts of alcohol per unit body weight, roughly proportional to their basal metabolic rates. Since our figures were obtained in dogs, with a higher BMR than man, this factor should tend to make our estimate too high.

As to greater loss of alcohol in breath and urine with high blood alcohol concentrations, a little simple arithmetic will make it obvious that, at a blood alcohol concentration of 500 mg/100 ml, assuming a urinary output of 2 l daily, 10 g of alcohol would be eliminated in the urine and about the same amount in the breath, or a total equivalent to less than 2 oz of liquor.

If we estimate a maximal intake of 2 quarts, as Beerstecher advocates, we run into trouble on the basis of heat production. Thus, we have 720 g of alcohol to burn, producing 4,320 cal. Work with radioactive carbon incorporated in alcohol has demonstrated that alcohol is burned promptly and fairly completely rather than being converted to other substances for storage in the body, and it is known that muscular exercise does not increase the rate of alcohol metabolism. Thus we are confronted with the phenomenon of a man at essentially basal conditions producing over 4,000 calories in 24 hr. If this were true, certainly the alcoholic would reap his reward of hell-fire prematurely.

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Ecological Use of Meteorological Temperatures

THE interesting report on "The Response of Plants to Climate," by F. W. Went (*Science,* **112**, 489 [1950]), serves to emphasize the need for a clear understanding on the part of biologists of the significance and limitations of meteorological and climatological temperatures. These temperatures, because of the peculiar needs of synoptic meteorology, are measured under protection from solar insolation and at some distance above the ground, generally about 6 ft. Both these facts seriously affect the problem of relating biologic responses to specific environmental temperatures.

First, the relationship of the temperature of plant parts and the immediately adjacent air to the meteorological air temperature clearly will depend largely on the radiative characteristics of the plant parts. Since the thermometer is never exposed to the sky, the same meteorological temperature may be accompanied by widely differing plant temperatures under natural conditions. As Went points out, the practical grower must know how temperature affects his crop