pend of $1,250 accompanies each appointment. Since appointments may take effect with the middle of February, applications for consideration should be sent at an early date to the Director of the Morris Arboretum, at the Department of Botany, University of Pennsylvania.

DISCUSSION

THE USE OF VITAMIN D FROM COD-LIVER OIL IN MILK AND BREAD

As was pointed out in an editorial which appeared in the *Journal* of the American Medical Association for November 26, 1932, it would be of advantage if antirachitic properties could be imparted in a suitable degree to a few foods (such as milk and bread) that enjoy wide-spread use, particularly in the dietary of childhood, because, in spite of several years of vigorous antirachitic propaganda, rickets remains all too prevalent in many communities.

Work with this specific objective in view has been carried on for some years at Columbia University. During the course of experiments conducted for the purpose of determining what substance in cod-liver oil conferred on this oil its well-known therapeutic value in the treatment of rickets, it was found that the antirachitic factor (to which McCollum gave the name of "vitamin D") could be concentrated in a fraction representing a very small part of the original oil.

The process by which this concentration is effected is briefly as follows: The cod-liver oil is treated with 95 per cent. ethyl alcohol, which dissolves out the antirachtic substance together with some other materials, chiefly fatty acids. The fatty acids are saponified, precipitated as calcium soaps, and treated with acetone which removes the active substance. The acetone solution is concentrated, and then treated with ether. After further purification of the ether solution, the ether is distilled off, leaving a brownish, waxy residue (still a very complex mixture) which can be conveniently handled dissolved in oil.

Rat assays showed this concentrate to be highly antirachitic, and later tests at the Children's Clinic of Bellevue Hospital and other health centers showed that it possessed the same curative effects on rachitic infants known to be produced by cod-liver oil.

In its original form, the concentrate had a restricted usefulness, since it contained much of the bad taste and unpleasant odor of cod-liver oil, but further refinements have made possible the elimination of these disadvantages and have produced a product which can be added to milk without altering its flavor. While we are still dealing with an impure substance, the activity of the more recent concentrates is now approaching that of irradiated ergosterol.

Dr. Barnes, of the Detroit Health Department, has conducted a series of tests with milk so treated on rachitic infants and has found that a quart of milk having 150 units of "vitamin D" (equivalent to 3 teaspoonfuls of cod-liver oil), and also amounts corresponding to about 100 units, give excellent results in the treatment of rickets.

It has also been found practical to add the concentrate to bread, as the vitamin D is not destroyed at baking temperatures. An arbitrary standard of 90 units to a 1-lb. loaf has been temporarily adopted.

An economic advantage of this process lies in the fact that the de-vitaminized cod-liver oil is still suitable for industrial purposes, and can be sold at full price so that the raw material cost of the concentrate is very low.

It was originally taken for granted by those engaged in the development work on the cod-liver oil concentrate that the process would be made freely available to any one who wished to use it, but objections to this plan began to multiply. In the first place, conferences with representatives of drug manufacturers made it clear that no one would undertake the extensive work needed for perfecting production methods and marketing the product unless protected from competitors who could enter the field after the pioneering work was done and secure profits without material outlay. Secondly, it seemed desirable to control the manufacture, application and promotion of the product, so that the public could be protected against improperly treated foods on one hand and false claims on the other.

Finally, the president of Columbia University indicated that he had had in mind for some time the creation within the university of some means of meeting just such situations. At his behest, the Board of Trustees passed a resolution creating a Board of University Patents, which now functions under the name of University Patents, Inc. This board consists of trustees and faculty members and is empowered to accept patent rights and copyrights and administer them for the public good. The vitamin D concentrate process was patented in several countries and the applications were assigned to University Patents, Inc. It was decided that royalties which might accrue were to be used for further research within the university.

License contracts were then entered into between University Patents, Inc., and National Oil Products Company, by which the latter obtained the right to manufacture and sell the concentrate in the United

States, Canada and Newfoundland, while the university undertook strict supervision of all advertising, stipulated control of the quality of the reinforced foods by means of regular assays by independent laboratories, and also maintained certain regulations as to prices to be paid by the public in order to keep these as low as possible. The university's royalty was also kept at a low rate in order to keep the burden on the consumer at a minimum.

Through this arrangement we have hopes of making a useful product available to the public in an efficient manner, at the same time safeguarding the interests of the university. A number of problems have presented themselves, some of which have been successfully met, but new ones are still coming up and await solution. It should be possible to set certain useful precedents.

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TWO CRITICISMS

I DESIRE to call attention to two practices which in recent years are occasionally noticed and which are objectionable. One is the use of the *unit* of wave-length, Å, for the wave-length itself, λ. The other is the putting of zeros in the tens columns of catalogues.

With the adoption of the Ångstrom as the official *name* of the unit of wave-length in the spectrum some writers began to use it in place of λ, the wave-length itself. This is neither logical nor advantageous. The use of λ before the number to designate wave-length had become an established practice, a necessity, and entirely satisfactory. It is by no means my feeling or wish to detract from the honor due the great Ångstrom, merely to clarify the use of this honor, which it seems to me is fairly obvious as the intentions of the body bestowing it.

Before the adoption of the Ångstrom as the unit (as well as since) the wave-lengths were given in ten millionths of a millimeter. Sometimes this unit of length was given as μ, but usually it was assumed to be understood. Now the Ångstrom, Å, is merely the *name* of this *unit* of a ten millionth of a millimeter, but obviously not the wave-length itself, which is the *whole number* of these units which go to make up the wave-length λ.

Those who use Å usually omit λ, as, for example, 4,340 Å instead of λ 4,340. While perhaps correct in a sense it is much as if we gave a certain number of inches and failed to say of what they were the measure. The users of Å in the way criticized will probably counter that it is well known that these are wave-lengths, to which I would reply that for a much longer time it has been known what the unit was.

It seems to me that here is where the fundamental conception is wrong—that the old designation λ is correct and that the unit Å applies only *within* the spectrum to specify the distances between lines or an arbitrary number of units. That when we wish to give the wave-length of Hγ we should say λ 4,340, but that if we wish to give the distance between the two calcium lines H and K we should say 35 Ångstroms instead of 35 ten millionths of a millimeter, or sometimes merely "tenth mu" among spectroscopists, as formerly.

The use of zeros in the tens columns in catalogues is not extensive and I have only noticed it in a few cases comparatively recently. The object presumably is to avoid such mistakes as occur occasionally by a number getting wrongly into the tens columns of such data as right ascensions and declinations or omissions thus causing confusion. Such mistakes happen but seldom; rarely indeed if the proofs have been read with sufficient care. In small lists of very miscellaneous data such a practice may find some justification but not in extensive catalogues, where entire pages often have the same tens column.

My objection to this practice is that not only is it in reality unnecessary, but chiefly that it is a bother to those consulting the catalogues—just that many more figures to take mental note of in getting out the data wanted. Unquestionably, the fewer the figures which the user of a catalogue has to even look at, the better.

As to the number of mistakes which would be avoided by filling in the tens columns with zeros, it can safely be said that they would not offset the work caused in preparing MS, typesetting and proofreading as well as in the use of the catalogues.

One hesitates to make any criticism whatever of some of the finest and most useful catalogues of data ever provided the investigator, but that feeling should not deter us from trying to better even them in small but essential practical matters.

I might add the suggestion that it is becoming increasingly useful to have the epochs at which spectroscopic data were obtained given in the catalogues *as far as possible*. This is usually given in original sources, but where possible it is useful to have such data in general catalogues also.

C. D. PERRINE
CORDOBA
OCTOBER 12, 1932

CONCENTRATION OF MICROFILARIAE BY THE SALIVARY SECRETIONS OF BLOODSUCKING INSECTS

DURING my stay in the Chiapas Mountains, southeast Mexico, in November, 1930, investigating on