when an appropriation is made by Congress pursuant to the authorization.

THE International Association of Milk Sanitarians has inaugurated the publication of the *Journal of Milk Technology,* a bi-monthly journal, to replace their annual yearbook series which had published the transactions of the association for the last twenty-five years. The new journal is the official organ of the association and will publish the papers which will be presented at the annual meetings as well as contributed papers which deal with the technology of dairy products. All business matters such as advertising, subscriptions, reprints, etc., are handled by the managing editor, William B. Palmer, East Orange, N. J. All matters regarding manuscripts, editorials, news items, announcements and other reading material are handled by Dr. J. H. Shrader, of East Orange, N. J.

DISCUSSION

BIOLOGICAL ABSTRACTS—LAST CALL

A NEW board has taken hold of *Biological Abstracts,* made its study and reached a decision. *Biological Abstracts* must go on—go on not merely, but score an outstanding success! It's an obligation of simple decency, quite aside from scientific necessity.

We have asked and received a generous grant to help establish *Biological Abstracts* during the course of the past eleven years.

Even with emergency grants, together with some help from other sources, we are to-day earning only 40 per cent. of our expenses. At the end of eleven years just 700 American biologists are on the subscription list, and a grand total of but 2,000 copies, personal, institutional and industrial, are taken the world over, with 600 of these abroad. Though sponsored by the Union of American Biological Societies, only one of these twenty societies has made a regular contribution, and to the end of 1937 only this one had laid an assessment on its membership for the support of *Abstracts.*

How our fellow scientists shame us! For see: Every member of the American Psychological Association has half his dues of $10 a year go to *Psychological Abstracts,* and he gets it. Something like $3.50 of the physicist's dues in the American Physical Society goes to support *Science Abstracts,* while from the American Chemical Society's treasury as well as from industry heavy grants are made annually for the publication of *Chemical Abstracts,* to which there are nearly 12,500 subscribers.

This disgraceful situation challenged the pride of a little group of younger biologists, who late in the year accepted the duty of framing a new plan. Time was short. They had no opportunity for far-reaching studies. Immediate action was necessary. They hit upon the scheme so successfully operated by the H. W. Wilson Company, which among other things issues a series of periodical indices, to agricultural, art, educational and engineering journals. Here the charge is made to vary with the number of such journals taken.

Adapting this method to *Biological Abstracts,* the Committee on Arrangements set a subscription scale based on number, not of biological journals, but of biologists in the institutions. Thus

$ 25.00	in case of			0– 3	biologists
45.00	"	"	"	4– 6	"
65.00	"	"	"	7–10	"
85.00	"	"	"	11–20	"
105.00	"	"	"	21–50	"
200.00	"	"	"	51–	"

with $7.00 the charge for extra copies, including personal subscriptions in such institutions.

The plan met with sharp and organized opposition on the part of librarians. For it quickly appeared that, though they paid the Wilson bills, they were becoming increasingly restive under them and at the time had committees at work to secure relief. Ours was thus the straw to break the camel's back.

So at the instance of certain of their number, the committee shifted these quotas from library assessments to institutional subsidies, pledged to a two-year limit and a general flat rate thereafter if publication continued.

Despite the shift, however, somewhat less than $23,000 has been received in subscription pledges. As much more is necessary even on a budget cut to the bone. Closing this gap is now a pressing claim of honor on every biologist in America. If *Biological Abstracts* is to be saved, it must be done before March is over. We can not afford to suspend the staff and interrupt the flow of journals. It is far easier and cheaper to strengthen a going concern than to resurrect a dead one. Unless new subscriptions are promptly pledged (not necessarily paid now), moneys on hand for 1938 will be returned to subscribers.

The problem belongs to the biologists. This is a last call on the biological organizations or biological leaders in all institutions to take *immediate steps* for securing the required quotas from their respective institutions. This means at least an agreement with the librarian in each case and perhaps with the general administration as to how the charge is to be met. It has been suggested that the library's minimum share should be $25, though many in the emergency will be glad to assume a much larger portion or even all. But the obligation is the biologists'. They must engineer the deal for the institution's total and then turn in their

personal subscriptions as never before. And they must do it now or never. We beg this.

Fortunately there is no deficit to wipe out. The year 1937 closed with some $12,000 on hand, just about enough to cover the printing bill of the three indices in arrears. But the staff can not be retained unless publication is to continue. If salaries have to come from this index fund, drastic editing of the remaining indicies must be resorted to. The board does not feel justified in starting Volume 12 till about $40,000 in subscriptions is assured, though the text of number 1 has long been ready for the press.

This number would cover the literature from December, 1937, into 1938. The second would complete the 1937 arrearage. Thereafter coverage would be prompt, and it would expand with expanding resources. Already several societies have taken action to give support. Others will act in March. It will not be long before it is a general habit. We have no fear of the future if we can but get through the present squeeze.

We are most fortunate in our new editor, Dr. J. E. Flynn. He has had long experience, possesses a cool head, promises no miracles and loves *Biological Abstracts* like a child. At great personal sacrifice he and his devoted staff work on margins all too narrow. They deserve well of us. In after time, this little group will hold an honored place in the annals of American biology.

So, too, the University of Pennsylvania, which so generously provides free quarters. And most of all the foundation which so willingly made possible the initiation of this project.

A new board of trustees took office in mid-February. They are: George S. Avery, Jr., Connecticut College; Howard P. Barss, U. S. Department of Agriculture; A. F. Blakeslee, Carnegie Institution; Paul R. Burkholder, Jr., Connecticut College; Anton J. Carlson, University of Chicago; Alden B. Dawson, Harvard University; Hubert B. Goodrich, Wesleyan University; A. P. Hitchens, Army Medical College; George W. Hunter, III, Wesleyan University; D. D. Irish, Dow Chemical Company; M. Llewellyn Raney, University of Chicago. The committee on arrangements gives way to an executive committee, consisting of Messrs. Hunter (*chairman*), Burkholder and Raney.

Mistakes your leaders old and new have made. *Abstracts* has not met expectations. The present plan works injustice and must be amended—later, not now while crossing a treacherous stream. In another year, we can change and then abandon the plan, while with many standing committees from the Union membership we can shape the journal to our needs. But all hands now to the rescue and afterward reform. Quickly, please.

Address Biological Abstracts, University of Pennsylvania, Philadelphia, Pennsylvania.

GEORGE W. HUNTER, III,
Chairman,
PAUL R. BURKHOLDER,
M. LLEWELLYN RANEY,
Executive Committee

THE NATURE OF VIRUSES[1]

DURING the last several years considerable evidence favoring the inanimate nature of viruses has been obtained. Perhaps it may be well to discuss some of the recent evidence that appears to favor the animate nature of viruses.

In an earlier paper[2] it was reported that juice extracted from mosaic tobacco plants contains a high concentration of material capable of producing stream double refraction, sometimes called anisotropy of flow. The concentration of this material parallels that of active virus in most cases; this and other evidence were considered to indicate that the virus is composed of sub-microscopic elongated particles. Stanley[3] refined what is apparently the same material and obtained it in the form of visible, spindle-shaped particles about 20 μ long $\times$ 0.4 μ wide, which were regarded as crystals and which gave the reactions of a protein. Wyckoff and Corey[4] x-rayed this material and from the x-ray pattern concluded that these particles are crystals. Bernal and Fankuchen[5] repeated the x-ray work and interpreted the results to indicate that Stanley's visible particles are not true crystals showing an indefinite repetition of identical units in three-dimensional space, but are composed of elongated molecules in the liquid crystalline state.

A majority of the workers on liquid crystals[6] appear to agree on the following explanation of the liquid crystalline state (this state is also sometimes called the mesomorphic, paracrystalline or anisotropic liquid state): Elongated molecules tend to come together and to orient themselves with the long axes of the molecules parallel, thus forming sub-microscopic elongated groups called swarms. In a suspension of material in this state the liquid does not necessarily show double refraction unless the swarms are oriented by streaming or by an electric or magnetic field. Upon standing, the swarms are supposed to come together, arranged with their long axes more or less parallel and

[1] The assistance of non-technical employees of the federal Works Progress Administration is acknowledged.

[2] W. N. Takahashi and T. E. Rawlins, SCIENCE, 81: 299–300, 1935.

[3] W. M. Stanley, *Phytopath.*, 26: 305–320, 1936.

[4] R. W. G. Wyckoff and R. B. Corey, *Jour. Biol. Chem.*, 116: 51–55, 1936.

[5] J. D. Bernal and I. Fankuchen, *Nature* (Lond.), 139: 1923, 1937.

[6] "Symposium on Liquid Crystals," *Trans. Faraday Soc.*, 29: 881–1084, 1933.