then fall off rapidly. If a new one is started every three weeks, a continuous supply of *Paramecium* for classes of many hundreds can be maintained.

For success it has seemed essential to (1) keep the grass mattress just awash and the grass about ¼ in. from the jar where the *Paramecium* grow best; (2) maintain a temperature gradient roughly between 23° and 25° C.; (3) use tap water free from injurious metals to start, and distilled water for later additions; (4) keep the jar covered with a loose lid; (5) try to encourage lagoon formation; (6) keep the grass blades at right angles to the temperature gradient, which should be in the direction of the incident light; and (7) shade from sunlight or really bright daylight.

# *Letters to the Editor*

### Convulsive Effects of Antibiotic Agents on the Cerebral Cortex

The lack of clinical evidence of neural toxicity when penicillin is administered systemically or intrathecally has led to the assumption that penicillin has no adverse effect upon the physiologic processes of the nervous system. The singular dearth of experimental studies of the effects of antibiotic substances applied to the brain has perpetuated this erroneous impression.

Both clinical and experimental studies on animals and man indicate that penicillin may produce convulsive manifestations when applied to the cerebrum. During systemic administration for conditions other than primary ones of the central nervous system, the electroencephalogram was found to be abnormal in more than 60 per cent of a series of 51 cases. Control records before and after penicillin therapy usually showed norm l tracings. Large doses of penicillin injected intrathecally in man (40,000 units) or monkey (10,000 units) may give rise to generalized convulsions followed in some cases by coma and death. The application of as little as 250 units of penicillin to the cerebral cortex of the macaque may induce epileptic attacks. These convulsive phenomena are not due to impurities in the preparation, for they have occurred with penicillin made by ten different manufacturers and with purified crystalline penicillin.

Streptomycin applied to the cerebral cortices of cats and monkeys in doses of 1,250 units induced convulsive manifestations in 30 per cent of the cases. Electroencephalographic records at such times showed slow waves and spikes with subsequent decrease of cortical activity lasting for one to three hours. Cisternal injection of 2,500 units of streptomycin in the monkey induced signs of severe cerebellar dysfunction.

Streptothricin applied to the parietal cerebral cortex in doses of 5,000 to 10,000 units produced clinical and electroencephalographic convulsive manifestations. Although these phenomena usually disappeared spontaneously in two to three hours, in two monkeys they persisted for two weeks. At necropsy the brains of these animals showed extensive softenings with perivascular petechial hemorrhages.

Actinomycin injected into the cerebral cortex or cisterna magna in a dose of 1 mg., after a latent period of nine hours produced severe prostration, fasciculations, and convulsions with death in one to seven days. At the site of injection into the cerebral cortex a severe necrobiotic reaction with edema and petechial hemorrhages was found.

Clavacin, when injected into the cerebral cortex in doses of 5 to 10 mg., induced clinical and electroencephalographic manifestations of convulsive phenomena with a marked decrease in spontaneous electrical activity of the brain.

There appears to be a relatively wide margin of safety between the antibiotic concentration and convulsive threshold of penicillin and streptomycin. Such does not appear to be the case for streptothricin, clavacin, or actinomycin.

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### The Genus *Aspergillus*

In his review of Thom and Raper's *Manual of the Aspergilli* (*Science*, 1945, 102, 460–461) Dr. B. O. Dodge says: "It is gratifying to see that the authors have continued to maintain that the generic name *Aspergillus* should apply not only to the conidial stage but also to the ascosporic stage. The genus *Aspergillus* is here to stay, regardless of rules of nomenclature." This statement should not be allowed to pass unchallenged by those who believe that progress in any branch of science dealing with living organisms will be facilitated by precise designation of the organisms concerned, and that such precision can best be attained by conforming to an established procedure based upon conference and agreement between as many as possible of those who are interested in such matters. In the mycological field, such a procedure is set forth in the International Rules of Botanical Nomenclature. Admittedly imperfect and incomplete (what codification of practice in other fields is perfect and complete?), the rules in their present form represent an orderly development of careful and intelligent thinking on the subject of nomenclature and are entitled to the serious consideration of all who use names subject to these rules. In the very rare cases in which it seems impossible

to abide by them, the reader is entitled to a clear statement of the reasons for divergence.

In discussing the taxonomic position of the genus, Thom and Raper (p. 6) follow E. Fischer's treatment in Engler and Prantl (1896) and list *Aspergillus* "in its proper place" among the Ascomycetes. They then proceed to define *Aspergillus*, credited to Micheli 1729, as an imperfect fungus, inserting in the description, toward the end, "perithecia found in certain groups only, unknown in most species." *Eurotium* Link 1809 is not formally diagnosed, but is discussed in general terms and discarded "for practical purposes." No notice is taken of the fact that Fries's *Systema Mycologicum* 1821–32 is the starting point from which the application of both names must be determined, nor is the use of these names by Fries or those who immediately followed him cited. Both *Aspergillus* and *Eurotium* were adopted by Fries (1825, 1832) and previously, but after the publication of the first volume of the *Systema*, by S. F. Gray (1821). *Aspergillus* is certainly restricted, as it was originally by Micheli, to what we now know as imperfect fungi. *Eurotium* applies in large part, if not entirely, to what we now know are ascomycetous fungi, characterized by asci borne in cleistothecia, and can be readily typified so that there can be no possibility of confusion. The application of Article 57 of the rules has been all but universally followed in such cases in other Ascomycetes, and no good reason is given for making an exception in the case of *Aspergillus*. In any specific instance where a species of *Aspergillus* is known to be the imperfect stage of a species of *Eurotium*, then the species, as a unit, must be transferred to *Eurotium*. The imperfect stage will continue to be classed and keyed with the other Aspergilli, the occurrence of cleistothecia being noted only as one of its several distinguishing characters. The genus *Fusarium* affords an exact parallel. A number of species of *Fusarium* are known to be imperfect stages of various species of *Nectria* and allied genera. In every such case, the fungus, as a species, is properly transferred to its ascomycete genus. The imperfect stage remains a *Fusarium*, and since that stage is the one likely to be met with and is of dominant importance in the practical utilization of knowledge of these fungi, the species of *Fusarium* with known perfect stages will continue to be listed and keyed with the species in which no perfect stage is known. Linder's monographs of the helicosporous fungi and of *Oidium* stress the imperfect stages of these fungi and make the treatment of the perfect stages, where known, subordinate. As a result, they are much more useful than they would be had this not been done.

Thom and Raper's volume constitutes one of the most outstanding mycological contributions of recent years and will unquestionably prove to be one of the most useful. The question here discussed will seem of little or no significance to most of those who will use the work to their very great profit. It is all the more to be regretted that the attitude toward nomenclature is so dogmatically asserted and so completely unsupported by examination of the considerations involved.

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## Replies to Dr. Visscher

Eight of the country's leading educators, mostly chancellors and presidents of great universities, addressed to President Truman an "appeal for the deferment of college science students," which appeared in *Science*, 1945, 102, 500–501. Maurice B. Visscher, M.D., addressed an open letter to these educators (*Science*, 1945, 102, 674), expressing the confident belief that the implications of what they had signed "were not apparent to most of you."

If Dr. Visscher wishes to discuss osteopathy, and has the necessary knowledge to do so, that is one thing. But when he ascribes "stupidity or cupidity" to a man of the standing and accomplishments of General Hershey because the latter included osteopathic students among those subject to deferment, he shows a total lack of knowledge both of the background of General Hershey's act, and of the established attitude of Federal and state governments for many years.

When the Selective Service law was new, the Office of Production Management studied the situation and recognized the futility of expecting the M.D. heads of the Medical Corps in the Army or the Navy to permit osteopathic physicians and surgeons to take the examinations to demonstrate their fitness for commissions as medical officers. Therefore, it recommended to Selective Service that both osteopathic physicians and surgeons, and osteopathic students, be included among the lists of persons engaged in essential occupations and subject to deferment. Selective Service issued such regulations on 16 July 1941. That it was not a matter of whim or caprice is proved further by the fact that more than 17 months later, in December 1942, when the regulations were promulgated providing for the deferment of preprofessional students—premedical, predental, etc.—preosteopathic students also were included.

General Hershey's recognition of the essential nature of the study and the practice of osteopathy, and of the preprofessional training of those who would be osteopathic physicians and surgeons, is not an example of "stupidity or cupidity"; it is, on the other hand, exactly consistent with the attitude of the Federal government over many years—except as its intentions are thwarted by men who hold the M.D. degree and happen to be in places of authority, as in the Medical Corps of the Army and the Navy.

The Federal government paid for the education of veterans in osteopathic colleges following World War I and is doing the same now.

Congress has again and again appropriated funds for the payment of osteopathic physicians as medical officers in the Navy and of osteopathic physicians to serve in Army hospitals.

Congress has just passed a bill to set up a department of medicine and surgery in the Veterans Administration in which osteopathic physicians are specifically stated to be eligible for commissions.

Dr. Visscher's failure to recognize the care which university chancellors and presidents use in acquainting themselves with the implications of communications which