

tures thus maintained have been brought to maturity with entire success.

This simple scheme was originally tried in an attempt to reduce the contamination which had been encountered where cotton plugs had been used. It was thought that a lid which would extend far down the sides of the container would put an end to contamination. Since adopting this procedure we have experienced practically no contamination in the shell vials beyond the rare infection introduced at the time of transfer.

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A Regrettable Error

While the editors of *Science* cannot be expected to assume responsibility for the errors made by contributors, it is a sad state of affairs when an article, coming from the physiological laboratory of a leading medical school, shows gross lack of understanding of the basic classification of the Animal Kingdom by elevating the Crustacea to phyletic rank (*Science*, 1946, 104, 74).

Admittedly, scientific knowledge is becoming so complex that we cannot be expected to have the relatively full knowledge of a field and its related subjects that our grandfathers had, but it does not seem too much to ask that a student in any branch of biological science closely related to zoology should know, at least by name, the major phyla. It would appear from the context of the article that the author believes that there are other arthropods besides barnacles which are important fouling organisms. This is not the case, and such a sweeping reference to "other members of the phylum Crustacea" compounds the original error. Perhaps this does an injustice to the author in question, and the error was simply a *lapsus calami*. Nevertheless, it is an unhappy one.

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Potentiation of the Antibiotic Activity of Aspergillie Acid by Bismuth

It has been reported by the undersigned in a previous article (*J. lab. clin. Med.*, 1945, 30, 899) that iron interfered with the antibiotic activity of aspergillie acid. It has also been shown that this interference was due to a complex formation between aspergillie acid and iron, the complex being inactive against bacteria.

While investigating the effect of other metals on the antibiotic activity of aspergillie acid, it was found that cobalt, nickel, zinc, arsenic, and bismuth caused a great increase in such activity. Of these, bismuth appeared to be the most effective when high dilutions of the various metals were used.

Bismuth, in a concentration which in itself caused no growth inhibition, decreased considerably the amount of aspergillie acid necessary for inhibiting completely the multiplication of *Staphylococcus aureus*. When human

serum was added to the broth, the potentiating effect of bismuth decreased, although it was still demonstrable.

Table 1 represents the effect of bismuth and/or aspergillie acid on a fast-growing strain of *Mycobacterium tuberculosis*, using the cylinder plate method.

TABLE 1

Additions to cylinder	Diameter of circle of inhibition (mm.)
Aspergillie acid, 1:10,000	13
Bismuth, 1:50,000	0
Aspergillie acid, 1:10,000 and bismuth, 1:50,000	21

The mechanism of the potentiation of the antibiotic activity of aspergillie acid by bismuth cannot be explained satisfactorily at the present time. However, since bismuth is a sulfhydryl-group destroyer and aspergillie acid binds iron, it is reasonable to assume that certain bacteria are highly susceptible to the simultaneous interference with sulfhydryl groups and iron.

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Disease Control in Frogs

A leprosy-like condition is common in laboratory frogs of the four species, *Rana catesbiana*, *R. clamitans*, *R. palustris*, and *R. pipiens*. A brief description of the condition and means of prevention follows.

The initial external signs are minute ulcers on the toes, usually accompanied by the red spots of redleg. Soon the tissues begin to regress, the soft more rapidly than the hard, until bare bone protrudes. In extreme cases entire feet are lost, but more often death intervenes before more than parts of toes have disappeared. Accompanying the ulceration is a loss of function of afferent but not of efferent nerves. For example, there is no response by decapitated frogs to strong irritants applied to affected limbs, but those same limbs will make the appropriate motions to brush away irritants on unaffected parts of the body.

The disease is readily prevented by keeping the frogs in tap water to which 0.15 per cent NaCl has been added. Growth is normal and health good in this solution when the diet is adequate, e.g. meat, bone meal, and an added source of vitamin D. This diet and the salt solution have reduced deaths from all causes almost to zero. It is good practice to keep all laboratory frogs in the salt solution. We have had only four deaths in two years among hundreds of frogs.

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A Further Note on the Meaning of Normal

Several discussions have recently appeared on the meaning of normal (*Yale J. Biol. Med.*, 1945, 17, 1493; *What people are*. Cambridge, Mass.: Harvard Univ. Press, 1945; *Science*, 1946, 104, 87). All of these discussions