of binomial nomenclature, and we are apparently as far from the end of it as we are from its beginning. The fifth cause of confusion is due to misidentification of old genera and misinterpretation of previous descriptions. Changes in specific names are caused by all these mistakes except the third.

No one seems to have a very clear conception of the enormous number of species of animals living in the world today. An actual count of the number of genera and species of Homoptera in the card catalogue of this order of insects in my laboratory shows that there are approximately 3,100 genera and 30,000 species recorded. Perhaps from these counts of the number of species of Homoptera we may be able to get a real estimate of the number of species of animals that have been described. From various counts and estimates, I believe that the Homoptera represent from 1/100 to 1/150 of the Animal Kingdom. This would give us an estimated total of 2,500,000 species of animals, already described, of which 1,500,000 are insects.

There is, of course, no such thing as stable nomenclature—certainly not until the last organism is fully described, illustrated, and catalogued. The discovery of any new species or new genus is apt to upset all our present notions about phylogeny or evolutionary principles. How poor our present knowledge is of even fairly well-known groups needs no demonstration. Certainly stable nomenclature is a will-o'-the-wisp, no more to be desired than a stable chemistry or physics, embryology or morphology. Anyone who thinks that we must still continue in nomenclature on the basis of the names that he learned 40 years ago is thoroughly unscientific.

My earnest plea is for support for taxonomy from all biologists—not alone for financial support but also for a sympathetic understanding of its problems, limitations, and mistakes, and above all for a realization that all taxonomists are making a sincere effort to advance their branch of biology for the assistance of all biologists.

A colleague recently called my attention to this advice by Mephisto to the Student:

Gebraucht der Zeit, sie geht so schnell von hinnen,
Doch Ordnung lehrt Euch Zeit gewinnen.

Freely translated so that he who runs may read:

Time flies so swiftly bye, use it,
Only systematics can teach you, do not abuse it.

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Dormant and Adventitious Buds

An attempt is made here to distinguish more precisely between dormant and adventitious buds. It is probable, however, that an accurate nomenclature on the entire subject of buds will be possible only in the distant future.

Stone and Stone (*Science*, 1943, 98, 62) state: "It would be profitable to restrict the use of the term *dormant* or *latent* to buds formed in the axils of leaves (including scales) on the young annual shoots" and adventitious buds to those that "arise outside the normal phyllotaxy." They mention, however, that "adventitious buds, once formed, may also remain dormant."

I propose to classify buds as trace and adventitious buds. The concept of the dormant bud as a structure with a trace to the pith, and the capacity to remain dormant, is not valid, because buds in roots become dormant.

The trace bud has a trace to the pith and develops in the elongating region of the shoot. Primary trace buds develop in the axils of leaves. Secondary trace buds arise in axils of scales of other trace buds. A primary trace bud can become the ancestor of many secondary trace buds, with its trace branching and extending to them.

An adventitious bud lacks a trace to the pith and can appear wherever elongation has ceased. Adventitious buds can be found in roots, shoots, leaves, hypocotyls, epicotyls, and callus. They also develop in axils of scales of other adventitious buds and are connected by branching bud traces. Adventitious buds can be mistaken for trace buds when the traces begin near the pith.

Any bud can develop into a shoot, either immediately or after a quiescent period. With the terms dormant and quiescent having the same meaning, quiescent adventitious buds are dormant buds, and the distinctions between them disappear. There are merely trace and adventitious buds.

These distinctions, now made, are hereby projected into tree culture. Root suckers come only from adventitious buds. Sprouts arise from both trace and adventitious buds. Coppice consists of trees whose boles come from trace and adventitious buds and arise as sprouts and root suckers. It is not to be expected that all shoots from a stump develop from buds of the same kind and that their traces begin in tissues of the same age. If all buds on a stump are trace buds, no shoots arise below the root collar.

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Aseptic Cultivation of Excised Plant Embryos

The cultivation *in vitro* of excised embryos of seed plants presents certain practical difficulties, some of which have been only partially overcome. One of these difficulties has to do with the growing of embryos in solid medium in such a way as to prevent contamination, at the same time reducing to a minimum the rate of drying of the medium and the number of transfers required to maintain the cultures in a healthy condition.

We are using an extremely simple device to accomplish these ends. When embryos of *Oenothera* are large enough to be transferred from liquid to solid medium, they are placed in shell vials (70 × 21 mm.) containing a suitable amount of medium, and another sterilized shell vial (60 × 25 mm.) is inverted over the first vial, thus serving as a lid. No cotton plug or other material is used. Sufficient gas exchange to maintain health is permitted between container and lid, since the edges and bottoms of the vials are not absolutely flat. The container and its lid fit tightly enough together, however, to reduce evaporation to a minimum, thus allowing transfers to be maintained for long periods. In no case have we transferred oftener than once a month, and in some cases the interval has been as long as three months. Cultures 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 Aspergillic 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 aspergillic acid. It has also been shown that this interference was due to a complex formation between aspergillic acid and iron, the complex being inactive against bacteria.

While investigating the effect of other metals on the antibiotic activity of aspergillic 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 aspergillic 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 aspergillic 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.)
Aspergillic acid, 1:10,000	13
Bismuth, 1:50,000	0
Aspergillic acid, 1:10,000 and bismuth, 1:50,000	21

The mechanism of the potentiation of the antibiotic activity of aspergillic acid by bismuth cannot be explained satisfactorily at the present time. However, since bismuth is a sulfhydryl-group destroyer and aspergillic 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