solve more than two tons of blocks that he collected.

The original work of solution was carried out in miscellaneous glassware vessels up to a capacity of 5 gallons. Finally, a stone tub holding about 70 gallons was installed in the National Museum. Present plans call for increasing the facilities to three tubs. The new equipment will be capable of digesting some seven tons of blocks in four or five years.

The modest but persistent solution program carried on since 1939 has already yielded an important collection occupying some 270 trays ($22\frac{1}{2}$ in. × $28\frac{1}{4}$ in.). Brachiopods are the most abundant fossils freed from the blocks from all parts of the Glass Mountains. These specimens are of especial importance because of their perfect preservation. Modern generic splits of the productids have been denounced by some paleontologists, but this program is yielding new evidence supporting the validity of many of them and also of additional new genera. Specimens of *Krotovia, Yakovlevia, Dictyoclostus, Aulosteges, Avonia, Waagenoconcha, Linoproductus,* and *"Marginifera"* with virtually all spines in place give a new conception of these odd brachiopods. Definite information as to the living habits of these animals and the meaning of their spines has already been obtained. About 75 brachiopod genera and some 200 species occur in the collection. Knight estimates 250 new species and 100 genera, about half of them new, among the gastropods. Miller has already described many of the cephalopods taken from the blocks. The pelecypods, corals, bryozoans, and sponges are equally well preserved. Chitons, trilobites, scaphopods, and remains of other groups are less abundant. Growth series of many species have been taken. By the time the solution program is completed, sufficient material will have been accumulated for statistical studies of many species.

The Smithsonian program will require about five years to dissolve all blocks on hand. While the acid is simmering, the men working on the individual projects will sort and study the accumulating material as follows: bryozoans, crinoids, and corals—Moore; brachiopods—Cooper; gastropods—Knight; pelecypods—Newell; cephalopods—Miller; and trilobites—Weller.—*G. Arthur Cooper* and *J. Brookes Knight* (U. S. National Museum).

Letters to the Editor

Commercial Fertilizer in the Culture of Fresh-water Algae

The culture of *Chlorella, Nitzschia closterium,* and *Prorocentrum triangulatum* in media containing small amounts of commercial fertilizers was reported by Loosanoff and Engle (*Science*, 1942, 95, 487–488), who found that complete fertilizers of the formulas 5–3–5 and 6–3–6 gave the best results. Recently Strickland (*Science*, 1946, **103**, 112–113) advocated the use of fertilizers of these formulas in the culture of marine algae (*Nitzschia, Navicula, Spirulina subsalsa,* and *Lyngbya semiplena*). Loosanoff and Engle used 1.0 gram of fertilizer in 1,000 cc. of sea water, although concentrations as dilute as 1:10,000 were found satisfactory. Strickland employed 0.5 to 1.0 gram per liter.

We have used commercial fertilizer in the culture of a number of fresh-water algae for the past 18 months. All of the forms given below were maintained in unialgal culture for that period with little difficulty. After preliminary tests 1.0 gram of fertilizer per liter of spring water (or distilled water) was chosen as most favorable for the growth of a variety of algae. Several fertilizers of different formulas were tested, but 4–10–4 appeared applicable to the culture of more species than any other.

One gram of fertilizer was shaken well with 1 liter of spring water. The mixture was heated to 80° C., shaken again, and filtered while hot through filter paper (Reeve Angel, No. 201). The clear filtrate was poured in 200-cc. lots into ordinary finger bowls, which were then placed in a hot-air oven and pasteurized. After cooling to room temperature the medium was inoculated with the desired organism, and then the bowls were covered and placed in the light of a west window.

Generally, depending largely on the amount of light and temperature, these cultures attained a maximum development in a period varying from two to four weeks and remained in a productive state for several weeks longer. Subcultures were prepared at intervals of two or three weeks.

The following organisms were found to grow luxuriantly in the fertilizer medium: *Euglena deses, Chlamydomonas monadina, Pandorina morum, Eudorina elegans, Gonium pectorale, Chlorococcum, Zygnema, Spirogyra* (species with single chloroplast), *Stigeoclonium,* and numerous unidentified species of diatoms and desmids in mixed culture. *Ulothrix, Mougeotia, Pithophora,* and *Melosira* were cultivated for periods up to two months, but eventually died out. *Euglena spirogyra, E. oxyuris, Oscillatoria, Vaucheria, Volvox aureus, Oedogonium, Nitella, Chara,* and several species of dinoflagellates would not grow in the fertilizer medium. The desmids, *Hyalotheca* and *Closterium,* grew well only if distilled water replaced spring water. The alga-bearing ciliate, *Paramecium bursaria,* was cultured successfully for many months, but opposite mating types would not conjugate on mixing, although branch lines of the two clones conjugated readily when grown in another medium.

Fertilizer medium (1) is inexpensively and easily prepared, (2) will support the growth of a variety of fresh-water algae, (3) produces large quantities of organisms in a short period of time, and (4) yields cultures relatively free of bacterial growth.

The author is indebted to the Smith-Douglass Company, Inc., Norfolk, Virginia, for the various fertilizers used in his experiments.

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Misuse of the Linnaean System of Nomenclature

In a recent paper by E. E. Dickerman on "The morphology and life cycle of *Proterometra sagittaria* n.sp., (*Trans. Amer. Soc.*, 1946, 65, 37), the larval form of a trematode is described and assigned a binary name of the Linnaean system (*Cercaria sagittaria* Dickerman), while the adult is described and given another Linnaean name (*Proterometra sagittaria* Dickerman). I must apologize to Dr. Dickerman for thus singling him out among others, but I have risked offense to this author in order to cite a recent and specific example of a practice in systematics that is so obviously in error that it cannot rate the approval of anyone interested in correct procedures in taxonomy. That is, two binomials of the Linnaean system (which go so far as to indicate that the larva and adult belong to different genera) are applied to the same animal, which is certainly contrary to approved taxonomic rules and practices.

Historically, of course, the practice stems from the fact that relationships between certain larval forms and the corresponding adult stages were not even suspected, the larvae and the adults being regarded as totally unrelated animals. In the present instance, however, this extenuating circumstance does not prevail. Furthermore, since there is no justification for applying different binary names of the Linnaean system to age classes of the same species (E. T. Schenk and J. H. McMasters, *Procedure in taxonomy.* Stanford Univ. Press, 1935. Art. 26, p. 33), and since the rule of priority is one of the cornerstones of the Linnaean system, it follows that the name first used in designating a species is the correct one to apply to all its developmental stages. Therefore, the correct name of the trematode described by Dickerman must be *Cercaria sagittaria* Dickerman, and not *Proterometra sagittaria* Dickerman, since the former name appears on page 37 of his paper, while that of the latter is on page 39. This is clearly not Dickerman's intention, since he uses *Proterometra sagittaria* in the title of his publication.

The absurdity of giving different Linnaean binary names to developmental stages of the same animal becomes increasingly apparent if extension of the practice to all animals be assumed. Thus, the tadpoles of frogs and toads, different in morphology and in habitat from the adults, might well be given Linnaean names distinct from those designating the adult stage of development. Even the early fetal stages of man, bearing little resemblance to the adult, and certainly in a habitat foreign to fully developed man, might no longer be classed within the genus *Homo*. Such examples could be multiplied indefinitely; in fact, no animal species would be exempt from a *series* of Linnaean binomials applied to various developmental stages, if this practice be extended to its logical conclusion.

The comments of G. G. Simpson (*Bull. Amer. Mus. nat. Hist.*, 1945, 85, 24) on the use of the Linnaean system are appropriate to the present discussion, for he says that "nomenclature is the grammar and vocabulary of zoology. Neither nomenclature nor grammar is an end in itself, but they are not less important on that account. The comparison can be extended to point out that literate men do not make mistakes in grammar and literate zoologists do not make mistakes in nomenclature. . . ."

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Synthetic Hydrophilic Colloids as Soil Amendments

In Technical Bulletin 189 of Michigan State College, attention is directed to the reduced rate of loss of water by surface evaporation and by transpiration, from greenhouse soils, when such soils are fortified with a suspension of a proprietary methyl cellulose. The results reported were striking. If applicable to Hawaiian soils, in the field, considerable economy in sugar-cane irrigation might be possible.

The important water economies mentioned in this report have not appeared with local soils. When local soils and local soils treated with a suspension of the colloid (the methyl cellulose used was secured from the Dow Chemical Company and is sold under the trade name of "Methocel") are exposed to evaporation, the natural soils lose water at a slightly faster rate, it is true. But the difference is only slightly greater than is required for statistical significance. There seems to be no point in attempting to overcome the great difficulties involved in using this material under field conditions with soils similar to those common in Hawaii.

The results reported in the bulletin cited are more nearly approached when silica sand (testing grade) is used in place of local soil. It would appear that the observed effects were due to a modification of surface and structural characteristics of the soil material and not to the hydrophilic character of the added colloid *per se*.

No significant difference in the rate of evaporation from pure water and from 1-per cent suspensions of methyl cellulose with viscosities of the 25, 400, and 4,000 centipoise grades was noted, when exposed to a constant environment, until the colloid had dried to a horn-like film.

The moisture equivalents of soils and of sands increased progressively with additions of the colloidal suspension. But unit mass of the colloid was much more effective in increasing the water-holding capacities for the sands than the soils.

The permanent wilting percentage of a specific, local natural soil was 23.8 ± 0.04 per cent. When treated with a 1-per cent suspension of the colloid, the permanent wilt-