Mechanical Engineering will be held in the Grand Central Palace from December 3 to December 8, inclusive, during the week that the American Society of Mechanical Engineers holds its annual meeting in New York.

THE national secretaries for the United States at the First International Congress of Anthropological and Ethnological Sciences, which will be held in London from July 30 to August 4, are Professor Wilton Marion Krogman, of Western Reserve University, for physical anthropology and Professor Melville J. Herskovits, of Northwestern University, for ethnology. Inquiries concerning the details of the congress may be addressed to them.

THE Annual Congress of the South-Eastern Union of Scientific Societies will be held at the University of Reading from July 11 to 14.

THE School of Medicine of George Washington University announces recent gifts for research projects and other facilities as follows: from the Rockefeller Foundation $2,198 for research in biochemistry; from Eli Lilly and Company $1,200 for a fellowship for work on the chemistry of insulin; anonymous $1,200 for special research on endocrinology, and from Mrs. Henry Alva Strong the sum of $5,000 for additions to the Roentgen-ray department of the University Hospital.

AN Associated Press despatch reports that the Public Health Institute, to which the Rockefeller Foundation gave $1,063,000 for construction and $100,000 more for equipment, was inaugurated by Premier Mussolini in Rome on April 22. Present at the ceremony were Ambassador Breckinridge Long, of the United States, and Dr. Lewis Hackett, representative of the Rockefeller Foundation.

THROUGH an error it was stated in a recent issue that the degree of LL.D. was conferred by Stanford University on Dr. Angell and Dr. Whittaker, whereas it should have been the University of California.

DISCUSSION

TAXONOMY AS A FUNDAMENTAL FACTOR IN BOTANICAL RESEARCH[1]

A TRIANGULATION survey starts with an accurately measured base line.

Two physicists working independently on the spectrum of a substance naturally first assure themselves that the material used in the two cases is the same.

A chemist attempts to corroborate the work of another but obtains a different result. The discrepancy is explained when it is shown that in one case the material used was pure, whereas in the other case it contained a slight admixture of a foreign substance.

In general, research workers in all branches of science must, in order to compare results, base comparable experiments upon a definite or accurate foundation.

Botanical research is no exception to this general principle. What is the rôle of taxonomy in botanical science and what is the relation of taxonomic botany to other branches of botany?

It is not claimed that taxonomic botany, the classification and naming of plants, is more important than physiology, anatomy or pathology, for example, only that it is equal with them.

Taxonomy has its own research problems, but here I shall discuss its relation to other branches of botany and shall attempt to show that it is fundamental or basic to these branches in the same sense that arithmetic is fundamental to algebra or to the calculus.

Research in most branches of botany depends for its usefulness and application on the correct identification of the species of plants investigated. If experiments upon plants are to be repeated by a second worker for confirmation of results it is necessary that the species used should be the same in the two cases. Much confusion has resulted from inattention to this seemingly self-evident truth.

Let us examine a few illustrative examples.

A cytologist investigates the chromosomes of the taxonomically difficult genus *Rosa*. How easily may his results be vitiated through lack of care in identifying the species of *Rosa* with which he works!

Experiment stations try out different samples of economic plants obtained under the same name. Differences in results may sometimes be traced to errors in identification of the material used. The Bureau of Plant Industry often imports seeds which are distributed to experiment stations for trial. Before distribution great care is taken to see that the seeds are correctly identified, otherwise the results might be of little value. Again the seeds planted may not germinate, their place being taken by other seeds already in the soil. The identity of the plants in the plots should be verified.

The ecologist deals with plant associations and often wishes to compare the floras of similar regions. Lists of plants from floral areas that are to be compared have little value unless the species are correctly identified. Species of oaks or blackberries reported under the same name from the two areas may prove when examined by a taxonomist to be different species.

A species of sandbur (*Cenchrus distichophyllus*)

[1] Read before the Botanical Society of Washington, on February 6, 1934.

endemic to western Cuba was reported from the Galapagos Islands. An examination of the specimen (sterile) upon which the statement was based showed that it belonged to *Sporobolus virginicus,* a cosmopolitan tropical coast grass. Conclusions by the ecologist or by the student of geographical botany as to the distribution of this species of *Cenchrus,* if the Galapagos specimen were included, and of tropical plants in general, would be very misleading.

The mycologist is especially dependent upon the phenogamic taxonomist for the correct identification of the host plants that support parasitic fungi. Since many parasitic fungi are very injurious to crop plants and in one of their stages may inhabit wild species, the identification of the alternative host may be of vital importance.

The same remarks may apply to the entomologist studying the life histories of insects injurious to crop plants.

The Biological Survey has made a study of the food habits of birds. Much information is derived from the examination of the contents of birds' stomachs or crops. A botanical taxonomist, expert in the identification of seeds, or an entomological taxonomist, expert in the identification of insects by means of wing cases or other hard parts, furnishes the basic information for the ornithologist. An examination of the contents of the stomachs of herbivorous wild animals will throw light on their food habits, inasmuch as the glumes or fruits of grasses, for example, being more resistant to the digestive fluids, may, when examined by a competent taxonomist, lead to the identification of the species eaten.

There is much need for expert taxonomic knowledge concerning the identity of many tropical plants that furnish important drugs, cabinet woods and other products known in commerce, but not connected with definite species. If it is desired to bring such plants into cultivation the rôle of the taxonomist becomes vital to the enterprise. We are at once reminded of the efforts to get into cultivation such plants as Cinchona and how failure has sometimes followed because the explorer did not obtain the proper species. For some years uncertainty surrounded the source of chaulmoogra oil, that from some sources being ineffective. We recall how Dr. Rock penetrated the forests of Burma and succeeded in finding the seed of the species producing the true product.

Errors in identification and the misapplication of names have sometimes led to unfortunate results.

Among parasitic fungi the specific name of the fungus is not infrequently taken from the name of the host plant. If the host has been incorrectly identified, the fungus will carry a misleading name. For example, a species of rust was given the specific name *olyrae* on the assumption that the host belonged to the grass genus *Olyra.* Dr. Arthur sent me a specimen which showed that the host was a species of the very different genus, *Arundinaria,* a kind of bamboo.

A generation ago, through some mischance now difficult to trace, Vasey grass (*Paspalum urvillei* Steud.; *P. larrañagai* Arech.), a fairly good forage grass, was introduced by the British into South Africa and Australia under the name *Paspalum virgatum.* The true *P. virgatum* L., a very coarse, bitter, razor-edged grass, called "cortadera" in the West Indies (because of its cutting leaves), is avoided by stock and is worthless agriculturally. British Colonial journals have described Vasey grass under the misleading name *P. virgatum,* causing much confusion in agricultural literature and wasted effort in obtaining seed from America.

Recently a man interested in paper-making material imported from Cuba for experiment a small quantity of *caña brava,* from which excellent results were obtained. He obtained a patent on the process and then ordered a large quantity of additional material, which proved entirely unsuited. The matter was referred to me for explanation. Specimens submitted showed that the first lot was a species of bamboo (*Bambusa*). The second lot was *Gynerium sagittatum,* a large native reed. The name *caña brava* (large or wild cane) is usually applied in Cuba to the large bamboo, but in a general way it is applied to any large wild grass. The person actually collecting the second lot had applied the name to the *Gynerium,* hence the confusion.

Taxonomists may make mistakes in the identification of plants, but these errors may be corrected if the plants upon which experiments or observations are based are preserved in a public herbarium or laboratory.

Finally, the relation of taxonomy to other branches of science may be summarized by saying that it furnishes the standard of measurement for them; or that taxonomy is to other branches of science what the dictionary is to literature, in that it enables workers to use given names in the same sense.

A. S. HITCHCOCK
BUREAU OF PLANT INDUSTRY
U. S. DEPARTMENT OF AGRICULTURE

THE EFFECTS OF X-RAYS ON PLANARIA DOROTOCEPHALA

AFTER studying the effects of x-rays on different sized populations of *Planaria dorotocephala* the following facts are evident. During the first two weeks the effects of x-rays seem to be largely of a non-specific nature in view of the fact that head forms developed resemble those induced by various depressants except for an additional type which has normal eyes