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.

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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 nonspecific 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 and auricles but a much shorter head than that occurring in the normal forms. This might seem to indicate that, simultaneous with the non-specific effect of x-rays upon head development, other effects, as upon cell division and growth, are occurring. As regards the non-specific nature of the more immediate effects of x-rays, it is significant that for any one dose of 4, 8 or 12 skin units the range of distribution of types regenerated increases as crowding increases.

No explanation is offered regarding the significance of the disappearance of tissue differentiated during the first two weeks. It seems to be an effect of x-rays on planarian tissue which gains expression at a period after regeneration has proceeded to its limits and which is first apparent in that region of tissue having the highest rate of metabolism.

In all x-rayed forms receiving 4, 8 and 12 skin units, the ultimate effect of x-rays is complete cytolysis. Cytolytic effects first become prominent on the thirty-fourth day after exposure. The rate of cytolysis is not greatly affected by crowding. The results of these experiments regarding the effects of x-rays are in accord with those of Bardeen and Baetjer, who conclude that x-rays affect cell division and cell differentiation and that the effects are probably confined to these two. They cite evidence from which they conclude that cell differentiation is not as much affected as cell division and that the effect upon cell division is not direct.

While both the more immediate effects and the delayed effects of x-rays may be specific upon the protoplasm, it does not necessarily follow that, because head frequency is affected by x-rays, the factors which control head frequency are specific and directly related to the activity of special formative cells. The formative cell theory of Curtis does not recognize the fact that the variation in head forms regenerated are the same type as those produced by other physical and chemical agents. It is no more necessary to assume the selective action of x-rays on formative cells than it is necessary to assume selective action of other physical and chemical agents which alter head frequency. The first apparent effects of x-rays, like various other agents, seems to be not on special formative cells but upon non-specific protoplasmic factors upon which head development depends.

Crowding varies only the rates at which effects of x-rays gain expression, allowing, in some instances, an increase in head frequency and a delay in cytolysis. As for the ways in which crowding alters these effects of x-rays on head frequency and length of life, the following possibilities may be considered: (1) Mechanical stimulation of the group upon each member; (2) a lowering of metabolic rate favoring a delay of cytolysis; (3) whatever these factors favoring group survival are, they are more effective as the dose of x-rays is increased.

The above conclusions were reached after studying the effects on over 800 Planaria.

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THE METHOD OF PROBITS—A CORRECTION

SINCE submitting the paper which appeared under the above title,[1] my attention has been called to recent papers by Hemmingsen[2] and by Gaddum,[3] in which substantially the same method has been proposed for toxicity tests with mice. Their "normal equivalent deviations" are measured from zero at 50 per cent. kill, taking the standard deviation as the unit, so that the elimination of a change in sign at 50 per cent. kill, as provided by the "probits," seems justified. However, the constant multiplier of 1.344447, used to equilibrate 0 and 10 on the probit scale with 0.01 and 99.99 on the percentage scale, interferes with the conversion from one system to the other. It seems desirable, therefore, to redefine the probit unit as equal to 5 plus (algebraically) the deviate of the normal curve expressed in terms of its standard deviation. As convenient sources of this deviate, either the Sheppard-Galton Table I[4] or the column of x corresponding to p and q in the Kelley-Wood Table[5] may be suggested. At 50 per cent. kill, the probit will be 5.00 as before; below 50 per cent. kill it will

TABLE I

Per cent. kill	Probits	Per cent. kill	Probits	Per cent. kill	Probits	Per cent. kill	Probits
1.0	2.674	50.0	5.000	80.0	5.842	95.0	6.645
5.0	3.355	52.0	5.050	81.0	5.878	96.0	6.751
10.0	3.718	54.0	5.100	82.0	5.915	97.0	6.881
15.0	3.964	56.0	5.151	83.0	5.954	98.0	7.054
20.0	4.158	58.0	5.202	84.0	5.994	98.5	7.170
25.0	4.326	60.0	5.253	85.0	6.036	99.0	7.326
30.0	4.476	62.0	5.306	86.0	6.080	99.1	7.366
34.0	4.588	64.0	5.358	87.0	6.126	99.2	7.409
36.0	4.642	66.0	5.412	88.0	6.175	99.3	7.457
38.0	4.694	68.0	5.468	89.0	6.226	99.4	7.512
40.0	4.747	70.0	5.524	90.0	6.282	99.5	7.576
42.0	4.798	72.0	5.583	91.0	6.341	99.6	7.652
44.0	4.849	74.0	5.643	92.0	6.405	99.7	7.748
46.0	4.900	76.0	5.706	93.0	6.476	99.8	7.878
48.0	4.950	78.0	5.772	94.0	6.555	99.9	8.090

1 SCIENCE, 79: 38, January 12, 1934.

2 A. M. Hemmingsen, *Quart. Jour. Pharmacy and Pharmacol.*, 6: 39 and 187, 1933.

3 J. H. Gaddum, Med. Res. Counc. Spec. Rept. 183, His Majesty's Sta. Of., 1933.

4 K. Pearson, "Tables for Statiticians and Biometricians. Part I," Cambridge.

5 T. L. Kelley, "Statistical Method," Macmillan, 1923.