SCIENCE:

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

HEREDITARY DEAFNESS. — A STUDY.

THE American Asylum is the oldest school for deaf-mutes in the United States. Its history covers three-quarters of a century. It has had under instruction, including those now in school, 2,459 pupils, a number exceeded by that of but one other school in this country. There have been nearly six hundred marriages, in which one or both of those making the marriage contract were once pupils in the school, and the offspring of these marriages number over eight hundred children. The records of the school have been carefully preserved, and from these and much personal inquiry we have been able to gather some facts which will be interesting at this time, when the question of hereditary deafness is receiving so much public attention. It will be seen at a glance that the field is a favorable one for the study of this subject, and, though not broad enough to warrant the drawing of general conclusions therefrom, the facts are valuable pointers, and may serve as one of the studies, which, when collated, will give sufficient data to work out a general law.

That there is a tendency to deafness in the offspring of congenitally deaf parents, there can be no doubt. Nor can it be doubted that this tendency is comparatively slight in the offspring of parents both of whom are adventitiously deaf. But let the facts speak for themselves. They are believed to be reliable so far as they go; but it is quite probable that in some of the families included in the following table other children may have been born since the dates at which the facts were reported. The general proportion, however, in all probability, would not be affected by such additions. In this table, c. = congenitally deaf; ad. = adventitiously deaf; h. = hearing; u. = age at which deafness occurred unknown.

When we consider how heavy a handicap congenital deafness is, it is appalling to think that 31 per cent of the offspring of the congenitally deaf may be born deaf. But I believe that this proportion is far above that of the general average of such cases throughout the country. I believe that there are causes at work in New England, not in operation to any thing like the same extent in other parts of the country, which will account for no inconsiderable part of the large percentage of congenital deafness in the offspring of congenitally deaf parents in that section.

Facts gathered from the Records of the American Asylum at Hartford, Conn.

	Number of Marriages.	Congenitally Deaf Children.	Children Adventitiously Deaf.	Hearing Children.	Children whether Deaf or Hearing unknown.	Whole Number of Children.	Percentage of Children Congenitally Deaf.
Husband, c.; wife, c....	52	48		88	15	151	31.78
Husband, c.; wife, ad..	37	5	1	74	7	87	5.74
Husband, ad.; wife, c..	51	17		102	5	124	13 70
Husband, ad.; wife, ad.	55	4		129	6	139	3.87
Husband, h.; wife, c...	16	12		52	2	66	18.18
Husband, h.; wife, ad..	5			16	2	18	
Husband, h.; wife, u...	1			4		4	
Husband, c.; wife, h...	26	9		58	5	72	12.50
Husband, ad.; wife, h..	6			13		13	
Husband, ad.; wife, u..	23			43	8	51	
Husband, u.; wife, u...	2			4	2	6	
Husband, c.; wife, u...	27	9		58	4	71	12.67
Husband, u.; wife, h...	1			4		4	
Husband, u.; wife, c...	2			4	1	5	
	31[1]						
Sterile.....	283						
Totals.....	590	104	1	649	57	811	12.82

[1] Three families are reported with several hearing children in each.

Of the fifty-two families in which both parents are congenitally deaf, twenty-three have congenitally deaf children.

Of the thirty-seven families in which the husbands are congenitally deaf and the wives adventitiously deaf, two have deaf children,— four in one family, and one in the other.

Of the fifty-one families in which the fathers were adventitiously deaf and the mothers congenitally deaf, seven produced deaf children, and nine of the congenitally deaf children come from two families.

There are fifty-five families in which both parents are adventitiously deaf, and from these have sprung four congenitally deaf children,— one in each of four families.

Four of the sixteen families in which the husbands hear and the wives are congenitally deaf have deaf children.

In five families out of the twenty-six in which the husbands are congenitally deaf and the wives hear, there are children born deaf.

Six of the twenty-seven families in which the husbands were congenitally deaf and the state of the hearing of the wives is unknown produced congenitally deaf children.

Of the twenty-six families in which both parents are deaf and have congenitally deaf children, there are five families in which one of the parents has one deaf parent, seventeen families in which both parents have deaf relatives of the same generation, four in which one parent has deaf relatives

of the same generation, and five in which neither parent has deaf relatives of the same generation.

Of the twenty-six families in which both parents are congenitally deaf and have hearing children only, there is none in which either parent has a deaf parent, so far as reported, twelve families in which both parents have deaf relatives of the same generation, eleven families in which one parent has deaf relatives of the same generation, and three families in which neither parent has deaf relatives of the same generation.

It will be noticed in the table given above that nearly one-half of the marriages are without issue, so far as we have been able to learn. It is probable that in some cases there have been children of whom we have received no account. In other cases the marriages are of recent date. But making due allowance for all these, the proportion of sterile marriages is still very large, much exceeding that in the general population. It is a serious question whether nature alone is responsible for this barrenness.

JOB WILLIAMS.

THE RELATION BETWEEN SCIENTIFIC AND ECONOMIC ENTOMOLOGY.[1]

THE subject of this address is not of the kind usually chosen for similar occasions, but is of none the less interest and importance. It is one, also, that is in full harmony with the genius of this society, which is the recognition of the pre-eminence of what is called the philosophy of science. Another reason makes it of especial immediate importance to us. Economic entomology is upon the verge of an era of great advancement. The establishment of the agricultural experiment stations have added to its ranks more young men of scientific training and ability, perhaps, than have ever engaged in this line of investigation. If economic entomology is but a phase of scientific entomology, then we want to put forth especial efforts to assimilate this young blood in our ranks: if, on the other hand, they are different and distinct, the difference will become more and more apparent as economic entomology develops, and we should define our position as on the side of pure science.

I believe that the pure sciences are distinct from the economic sciences; that this is the primary division of science. We seem to be prone, in this utilitarian age, to try to find excuse for the pursuit of pure science by holding up the possibility of applying our discoveries for economic ends. Let us recognize, and not act as though we were ashamed of, the fact that the sole aim of the student of pure science is the discovery of truth, catering to human wants being entirely out of his province.

It may be said, that, laying aside this matter of sentiment, the human wants are supplied through the discoveries of science, and that this is simply the application of science for economic purposes, or, to put it a little stronger, that economics are but applied sciences. Such a statement comes from the conception that facts are, or in some way become, the peculiar property of a science. This is not the case, however Perhaps, if we could see all the intimate relations sciences have to each other, we should say that every fact belongs to every science; at any rate, we could scarcely name a fact which when closely viewed has not more than one bearing. An example of the far-reaching character of a fact is that of the origin of species through evolution. When Darwin established the truth of this fact, it soon came to be recognized that this basal fact of evolution was a fundamental principle of almost every other science which had occupied the attention of man. For economic purposes it is the facts which are appropriated, and in the same way that the biologist appropriates the facts discovered by the chemist. Economic sciences no more become departments or applications of other sciences by using some of the same facts than biology becomes a department or application of chemistry.

It may be further contended that in the cases cited above we have to do with real sciences, but that the so-called economic sciences have no right to the title of science, that they are essentially different. This will lead us to a consideration of what a science is. We have just seen that it does not consist of a body of facts peculiar to itself ; but, on the other hand, it is evident that facts are closely connected with it, that it depends indeed on a set of facts, and, further, that these facts have some definite relation to each other and are susceptible of a rational classification. This classification is not the science, as it cannot express nearly all the relationships, but these relationships do constitute the science. Any one science does not comprehend all the bearings of any fact, but only such as have a relation to that one subject. The science of entomology, for example, consists of the relationship of the facts to insects. The relation of the same facts to the subject of plant-diseases belongs to another science. When the subject is economic, the production of honey, the feeding of stock, or the like, are there any grounds upon which we can refuse it the title of science ?

The economic sciences are all infantile, many perhaps not yet even conceived of by man. They are the only true foundation to the useful arts. Agriculture is a science, though hidden by a mass of misconception and empiricism. It must make its advances by the same methods that have made the pure sciences what they are. A clear conception of the object and structure of the science and experimentation with all the conditions under control are essential. Economic entomology as generally understood is chiefly a department of agriculture, but includes much heterogeneous material. To be a scientifically rational term, it must, like some of the genera of the older naturalists, be restricted. I can in no better way show the difference between it and scientific entomology than to indicate the parts of economic entomology, and show where they belong among the economic sciences.

Insects of economic importance may be grouped into six categories: first, those directly injurious to man, which properly forms a department of medicine; second, those attacking the domestic animals, a part of veterinary medicine; third, those injuring cultivated plants, which includes by far the major part of the injurious insects, and to which the term "economic entomology" should be restricted (it is only a part, and perhaps not a natural part, of the science which deals with the diseases of cultivated plants) ; fourth, those which destroy other property (in this category are the insects attacking furs, woollen goods, etc., and the food-stuffs, which belong to domestic economy and at the same time to commerce ; library insects belong to library economy, and so on) ; fifth, those directly beneficial to man, which includes the bee, the silk-worm, etc.,— industries which form one of the primary divisions of agriculture; sixth, those indirectly beneficial to man by destroying the injurious insects (these insects, of course, belong to the sciences that consider the insects which are their victims).

Finally, to recapitulate, scientific entomology is a depart-

[1] Annual address of the retiring president of the Cambridge Entomological Club, Charles W. Woodworth, Fayetteville, Ark., at its meeting, Jan. 9, 1891 (from Psyche).