

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 special 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 es-

tablished 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*).

ment of biology; economic entomology, of agriculture. They have all the difference between them that there is between a pure science and an economic science. Can we as a society include them both? I think we should not. On the other hand, the economic entomologists are nearly all at the same time scientific entomologists. These we can and do welcome.

AFRICAN AND AMERICAN.

At a meeting of the Canadian Institute, Toronto, Jan. 24, Mr. D. R. Keys, M.A., read, on behalf of Mr. A. F. Chamberlain, M.A., fellow in Clark University, Worcester, Mass., a valuable and interesting paper entitled "African and American: the Contact of the Negro and the Indian." He said that the history of the negro on the continent of America has been studied from various points of view, but in every case with regard to his contact with the white race. It must therefore be a new as well as an interesting inquiry, when we endeavor to find out what has been the effect of the contact of the foreign African with the native American stocks. Such an investigation must extend its lines of research into questions of physiology, psychology, philology, sociology, and mythology.

The writer took up the history of the African negro in America in connection with the various Indian tribes with whom he has come into contact. He referred to the baseless theories of pre-Columbian negro races in America, citing several of these in illustration. He then took up the question ethnographically, beginning with Canada. The chief contact between African and American in Canada appears to have taken place on one of the Iroquois reservations near Brantford. A few instances have been noticed elsewhere in the various provinces, but they do not appear to have been very numerous. In New England, especially in Massachusetts, considerable miscegenation appears to have taken place, and in some instances it would appear that the Indians were bettered by the admixture of negro blood which they received. The law which held that children of Indian women were born free appears to have favored the taking of Indian wives by negroes.

On Long Island the Montauk and Shinnecock Indians have a large infusion of African blood, dating from the times of slavery in the Northern States. The discovery made by Dr. Brinton, that certain words (numerals) stated by the missionary Pyrlaeus to be Nanticoke Indian were really African (probably obtained from some runaway slave or half-breed), was referred to. In Virginia some little contact of the two races has occurred, and some of the free negroes on the eastern shore of the Chesapeake peninsula show evident traces of Indian blood. The State of Florida was for a long time the home of the Seminoles, who, like the Cherokees, held negroes in slavery. One of their chiefs was said, in 1835, to have had no fewer than one hundred negroes. Here considerable miscegenation has taken place, although the authorities on the subject seem to differ considerably on questions of fact. In the Indian Territory, to which Cherokees, Seminoles, and other Indian tribes of the Atlantic region have been removed, further contact has occurred, and the study of the relations of the Indian and negro in the Indian Territory, when viewed from a sociological standpoint, are of great interest to the student of history and ethnography. The negro is regarded in a different light by different tribes of American aborigines. After mentioning a few isolated instances of contact in other parts of the United States, the writer proceeded to discuss the relations of African and Indian mythology, coming to about the same conclusion as Professor T. Crane, that the Indian has probably borrowed more from the negro than has the negro from the Indian. The paper concluded with calling the attention of the members of the institute to the necessity of obtaining with all possible speed information regarding (1) the results of the intermarriage of Indian and negro, the physiology of the offspring of such unions; (2) the social status of the negro among the various Indian tribes, the Indian as a slaveholder; (3) the influence of Indian upon negro and of negro upon Indian mythology.

DEPOPULATION OF FRANCE.¹

It is somewhat startling to find that the depopulation of France is becoming a common subject of discussion among the *savants* of that country. The phrase is perhaps somewhat stronger than the circumstances of the case warrant, the fact being that the population of France is simply stationary. Still it is a striking and significant circumstance, that, while the population of all the other great European nations is steadily and rapidly advancing, that of France remains at a standstill. On economic grounds, this arrest of increase in number might seem not altogether an unmixed evil, inasmuch as it should tend to diminish over-competition, and to ease the already excessive struggle for existence among the lower classes; but an impression widely prevails, that, given a fairly normal and healthy social condition, a growth of population is a natural result, and that a stationary or declining population is an index of some grave disorder of the body politic. We cannot adequately discuss this large and difficult question, but our French neighbors evidently think that something is amiss, and are looking around for the cause and for its remedy. Probably the causes are numerous and complex. Social habits may account for a good deal. The French custom of subdividing land and of providing a dowry for girls offers an obvious motive for keeping down the number of children. Where, as in the west of Ireland, the peasantry have a cheap food-supply, and are constitutionally averse to thrift, large families are the rule; but in France thrift is a virtue carried almost to excess, and the obligation of the parents to provide for each new accession to the family is clearly recognized. Moral causes have been supposed to play a large part in the arrest of the population of France, and we are far from underestimating their importance; but this is a difficult and delicate problem, on which it would be rash to dogmatize without the most ample evidence.

While some of the causes of the phenomenon under discussion may be obscure and remote, others lie under our eyes, and cannot be too carefully scrutinized or too frankly acknowledged. In a recent address before the Académie de Médecine, Dr. Brouardel drew attention to the abnormal mortality from small-pox and typhoid-fever which prevails in France. He points out that while Germany loses only 110 persons per annum from small-pox, France actually loses 14,000. Dr. Brouardel attributes this astounding difference to the rigid way in which vaccination is enforced in Germany, and to the carelessness of his own countrymen in this matter. Statistics show that in 1865, when vaccination was not obligatory in Prussia, the mortality was 27 per 100,000 inhabitants. After vaccination was enforced, the mortality fell in 1874 to 3.60 per 100,000, and in 1886 to 0.049. At the present time the mortality from this cause in France is 43 per 100,000. We make a present of these figures of Dr. Brouardel to the Royal Commission on Vaccination.

As regards typhoid-fever, the deaths due to this disease in France amount to 23,000 per annum. Dr. Brouardel gives a great variety of statistics to show that the liability to typhoid is in direct proportion to the imperfections in the water-supply, and that, in proportion as a sufficient supply of pure water is provided, typhoid abates. Thus, at Vienne the typhoid mortality was 200 per 100,000 while the inhabitants drank surface, hence often polluted, water; but this mortality fell to 10 per 100,000 on a thoroughly good supply being obtained. At Angoulême the introduction of a new supply of pure water reduced the number of cases of typhoid in the proportion of 0.063 to 18. At Amiens, among the military population, the typhoid mortality fell from 111 per 10,000 to 7 when a pure supply of water was secured by artesian wells. At Rennes the inhabitants formerly drank from contaminated wells, with the result that typhoid-fever was always endemic. The introduction of pure water reduced the deaths from typhoid among the military population from 43 per 10,000 to 2. Investigations carried out at Besançon, Tours, Carcassonne, Paris, and Bordeaux entirely corroborate the above striking figures. Typhoid-fever is responsible for the death of 1 soldier in 335 in France, or 298 per 100,000, and this in time of peace. In war its ravages are even far greater. Thus the expeditionary

¹ From the London Lancet, Dec. 20, 1890.