

Dr. William Popper delivered a lecture on 'Superstitions of the Arabs,' based on his researches and personal experiences among the Arabic-speaking peoples of the Orient.

One hundred and thirty-five persons attended the meeting. A. L. KROEBER,
Secretary.

THE BERKELEY FOLK-LORE CLUB.

THE third regular meeting of the Berkeley Folk-Lore Club during 1905-6 was held in the Faculty Club of the University of California on Wednesday evening, January 31. President A. F. Lange presided, Professor W. F. Bade acting as secretary *pro tem.* Dr. W. Popper and Dr. A. W. Ryder were proposed for membership in the club and unanimously elected. Professor G. R. Noyes presented the paper of the evening on 'Servian Heroic Ballads.' Mr. Nikolitzsch, who was present as the guest of the club, read one of the ballads in the original. The paper was discussed at length by the members.

A. L. KROEBER,
Secretary.

DISCUSSION AND CORRESPONDENCE.

ISOLATION AND THE EVOLUTION OF SPECIES.

I HAVE read with the greatest interest the discussion on isolation and its relation to evolution, commencing with President Jordan's article in *SCIENCE* for November 3, 1905.

There are many reasons for believing that in the earlier stages of the segregation that produces two or more species from one, geographical isolation, or at least some degree of local isolation, has had in many cases an influential part. It is, however, important to observe that, when the local variety multiplies and passes over into areas occupied by the original stock, its continued separate evolution must depend on some other form of isolation.

One form of isolation that may prevent the variety from being swamped by free crossing is seasonal isolation due to its having gained a separate season for propagating. This form of isolation is mentioned in one of the quotations given in President Jordan's article.¹

¹ See page 552.

Another form of isolation is what Romanes has called physiological isolation, which he defines as the prevention of free crossing due to physiological incompatibility between the reproductive cells of different groups of creatures.²

But this extended use of the word isolation is not found in the works of Darwin, and even at the present time many writers follow his usage by treating the term as meaning the prevention of free crossing due to geographical separation. This limited meaning of the word, as used by Darwin and the writers of his time, led me for many years to seek other terms when discussing the broad problem of the prevention of free crossing. Separation and segregation are the terms I have chiefly used.³

I observe that E. A. Ortmann in his discussion entitled, 'Isolation as One of the Factors of Evolution,' appearing in *SCIENCE* for January 12, 1906, also uses 'separation' as an equivalent for isolation when meaning the prevention of free crossing. In some of the previous discussions on the subject it has been pointed out that sometimes the nearest allies of a species are found in the same district. In such cases the point of chief interest is that some other form of separation will be found to prevent free crossing between the different races and species. Closely allied plants may bloom at separate seasons and so occupy the same district without crossing. In other cases the pollen of each variety may be prepotent on the stigmas of the same variety. Varieties of birds and mammals differing chiefly in color may be held apart by sexual or social instincts. These and many other forms of isolation have been pointed out in my work on 'Evolution, Racial and Habitual,' published by the Carnegie Institution.

I have also brought together many reasons for believing that without isolation one species can not be transformed into two or more

² See 'Darwin and After Darwin,' Part III., entitled 'Isolation,' pp. 43-47.

³ See my three papers published in the *Linnean Society's Journal*, between 1872 and 1889, also three articles published in the *Amer. Jour. of Science* for 1890.

species; while with complete isolation more or less divergence may result before diversity of selection comes in to intensify the segregation.

Of selection I also discover many reflexive forms due to the influence of members of the same species upon each other, as well as natural selection and artificial selection due to influences lying outside of the species.

In considering the factors producing different inheritable types of related organisms we have to distinguish between the factors dividing the original stock into separate inter-generating groups and those producing diversity of inherited character in the separate groups. The former process we may call racial demarcation through isolation, and the latter racial intensification through survival resulting in selection. Isolation and selection we find to be cooperating factors in controlling racial segregation.

Our investigation of the factors producing evolution will, however, remain very incomplete unless we study the influences producing different social groups, in which different habits of dealing with the environment are originated and maintained, not by variation and heredity, but by innovation and tradition. Here again we must distinguish between the influences dividing the original group into separately associating groups, and those that establish a diversity of habits and acquired characters in the separate groups. The former process we may call habitual demarcation through partition and the latter habitual intensification through success resulting in election. Partition and election we find to be cooperating factors in controlling habitual segregation.

In the bionomic history of many species the great significance of habitual segregation is found in the fact that it is the forerunner of racial segregation.

For illustrations of the influence of habitual segregation on racial segregation I would refer to my work on evolution published by the Carnegie Institution.

JOHN T. GULICK.

OAKLAND, CAL.

SALMON HYBRIDS.

TO THE EDITOR OF SCIENCE: I have received from Mr. C. W. Dorr, of the Alaska Packers' Association, certain notes by Mr. J. A. Richardson on experiments in hybridization of salmon, undertaken in the hatchery at Karluk, Alaska. These will be of interest to zoologists.

DAVID STARR JORDAN.

Mr. Richardson writes as follows:

Crosses have been made of all of the salmon family except the steelhead. These experiments have been made for the novelty of it. The peculiarities of each are invariably the same from year to year, and practically none of the fry survive.

The cross between the red salmon and king salmon produces a very queer lot. Out of many thousand eggs hatched, ninety per cent. of the fry will have no eyes; the nose is long and pointed; the sac is of very light color and quite watery in appearance. Only two per cent. or three per cent. are reasonably well formed fish, and the most of these die.

The number of eggs which fertilize is about normal, but it is noticed that a larger number than usual of the white eggs removed from the baskets contain embryos that have ceased to develop. This cross has been made both ways.

It has been demonstrated that the cross between the red salmon male and the humpback female is very superior to other crosses—so much so that it leads to the belief that there is closer relationship between these two species of the salmon family. An extended experiment by crossing these two species is now being carried on. The loss of eggs and fry is being counted and notice taken of general conditions. We have fine specimens from the season 1904 (eggs taken in 1903) of this cross. They are about eight months old, two inches long, and bright, clean, silvery fish, rather long and slim.

SPECIAL ARTICLES.

AN INTERESTING DISCOVERY OF HUMAN IMPLEMENTS IN AN ABANDONED RIVER CHANNEL IN SOUTHERN OREGON.

DURING July and August, 1905, the writer was in the field in southern Oregon under the