

enough for them to be incapable of breeding together.¹

It will be readily apparent that it is extremely difficult to absolutely demonstrate a case like that represented by the dotted lines. Perhaps in no instance is the series of specimens so complete as could be desired, and usually it is not nearly adequate. The case may be complicated by the existence of half a dozen subspecies, occupying small areas, justifying the nomenclature of the 'aspiring young naturalist.'

Last year I published a revision of *Hymenoxys*, a genus of plants (*Bull. Torrey Bot. Club*, September, 1904). I found in that genus a case which seemed to me to exactly agree with those postulated by Dr. Allen, except that the large form was southern, the small one northern. The difference between the extremes was such as to almost constitute a *reductio ad absurdum* of my classification; yet when I had the whole series (borrowed from several large herbaria) spread out on a table I did not know where to draw any hard-and-fast lines. I accordingly called them all subspecies of *Hymenoxys chrysanthemoides*, but a comparison between plates 22 and 23 of my paper will doubtless cause many readers to wonder how I could do it.

Having myself attempted to demonstrate

¹ *Homo sapiens*, who offers a classical example of segregation without physical barriers, is now being subjected to this very process. The result will probably be greater racial uniformity, or rather the breaking down of racial differences, with increased *individual* variability, due to the fact that while the individuals will cross, many of their *characters* have become so far differentiated that they will not do so. The mongrel dogs in the street afford an illustration of this. How all this will affect the development of the higher human attributes, is a question which deserves serious thought. The increase of insanity and crime in civilized countries, though obviously due largely to quite other factors, may be partly explicable as a result of incongruous combinations, produced by 'Mosaic inheritance.' Genius, if produced in good quantity, may become more erratic. On the other hand, no doubt such evils as war, famine and pestilence will be gradually overcome.

this case, I perhaps ought not to object to any of Dr. Allen's; but all I wish to urge is, that the evidence should be made more complete and the different classes of cases should be distinguished. In the case of the *Hymenoxys*, we do not know what results would come from sowing Texas seed in the vicinity of the City of Mexico, and *vice versa*. Experiment might show that while the characters of the herbarium specimens overlapped, there were in reality several distinct plants, constitutionally and essentially different, and that even most of the apparent intermediates were really hybrids. Experiment might show, on the other hand, that several so-called subspecies were merely phases of one thing, the individuals directly modified by the climate. This has been demonstrated for certain mountain plants, by dividing a single individual and growing the halves at different altitudes. I do not anticipate these results in the case of *Hymenoxys chrysanthemoides*; but it would be very well worth while to see whether they are attainable.

Finally, it is by no means to be assumed that the 'effects' of climate are necessarily direct, and not brought about through the agency of natural selection. This, however, is a large question, not requiring discussion at this moment.

T. D. A. COCKERELL.

ONTOGENETIC SPECIES AND CONVERGENT GENERA.

THE recent exchange of views in SCIENCE, between Dr. Jordan and Dr. Allen concerning 'environmental species,' gives occasion to notice the widening gap between the formal conception of species entertained by the biologist as units of evolution, and the actual notion of species used by the systematist in working over a group, or the specialist in arranging a collection. For if 'ontogenetic species' do occur, as there seems reason to believe, a marked distinction must be made in theory between them and the *phylogenetic species*, as they might be termed, denoted by the older, or Darwinian, definition which requires the feature of inheritance of the characters marking them. In practice, of course, this feature has usually been taken for granted

by the systematist, or has rarely been considered at all, for he has no means of testing it, and to him the two sets of adaptive characters must be equally specific, whatever their origin. Nor is it easy to see how a universal measure of discrimination can ever be supplied, for even if a few general laws were derived, as doubtless they will be, from experimental observation of the kind suggested by Dr. Jordan, it is not likely that they would be serviceable in special cases much, if at all, beyond the limits of what we now call local or climatic variation, and, manifestly, it is out of the question that every uncertain case can be brought under such experimental conditions as those which have shown the real relations of the Loch Leven trout. Organic selection has much emphasized this difference between the logical and the practical ideas of species, and has supplied the taxonomist with a problem of which he has no solution in sight. It seems probable that the lack of such a solution is behind the most extreme of the opinions held by the authors of the respective theories of 'mutations' and 'isolation.'

Quite another modifying influence upon present methods of classification appears in the facts of analogous evolution, of which paleontologists have been accumulating evidence. If like environments tend to induce similar modifications in unrelated groups, it at once becomes evident that systems of classification based upon such likenesses of structure may not in all cases reflect the genetic connection which, since Darwin, we have believed them to approach. Therefore, classification in the modern sense being worthless if it fails to correspond to descent, it seems not unlikely that geographical considerations may come to enter more largely into the composition of genera than has hitherto been the case with conservative naturalists, for in a strictly genetic system it would not be permissible to place in the same genus species so widely separated by present or past geographical barriers that we are forced to believe that they can not have developed from the same source.

ARTHUR ERWIN BROWN.

THE ZOOLOGICAL GARDENS,
PHILADELPHIA.

ETHNIC TYPES AND ISOLATION.

RECENTLY several articles have appeared in this journal discussing geographical isolation as a factor in the differentiation of species, and the illustrative observations taken from both the animal and plant life of North America correspond in a way to well-known ethnographical facts. The writer does not intend to discuss the virtues of the isolation theory as a condition of biological variation, but wishes to call attention to the fact that such a theory seems to account for a number of differences in the culture of Indian tribes.

It is customary to divide the aboriginal inhabitants of North America into linguistic stocks and it is estimated that there are at least fifty distinct linguistic families north of Mexico. These were distributed in a very striking way. In the Mackenzie basin we have the Athapaskan stock, around the Great Lakes, Hudson Bay and Labrador, down the Ohio River and east to the Atlantic Ocean, the great Algonquin group with an intrusive Iroquois stock in the vicinity of New York state. In the Gulf states were the Caddoan, the Muskogean, and a number of small groups. The great plains and prairie area was dominated by the Sioux and Shoshone stocks. If in contrast to this we examine the Pacific coast we find in California alone twenty stocks and between the northern boundary and Alaska ten other stocks. The Pueblo region to the south presents conditions somewhat similar. Thus a brief résumé of the distribution of linguistic stocks in North America brings to view relations strikingly similar to the distribution of species as noted by President Jordan.

Some one has proposed to account for the great number of Indian languages in California by assuming that a few young children lost now and then in the isolated valleys of the country would, if they survived, develop new languages. While ethnologists do not take this theory seriously they often give expression to a similar view, viz., that a people without a written language living for a long time in a given area separated from the parent stock will gradually form a new order of speech. This is a theory of differentiation by