

character of deposition to slight changes of sea-level. Downwarped in Sabine times (in areas where now accessible) it remained flooded till into St. Maurice times without showing very rapid, or well-defined, sharp changes, faunal or lithological.

Vertebrate paleontology assures us that the holarctic waters have been somewhat drained off now and then during Tertiary times, else land areas have risen out of the seas, furnishing bridges for mammalian migration between the New and Old worlds. The correlation of holarctic with Gulf age tides is a fascinating problem for contemplation, if not for solution by present-day earth-science workers. Perhaps our co-workers on the West Coast may have arrived at some general conclusions regarding tide-level conditions there during the Eocene ages. These, it seems to the undersigned, might be of vast importance for working out the physical history of our Eocene series.

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December 5, 1918

HEREDITARY DEFICIENCIES IN THE SENSE OF SMELL

BLAKESLEE¹ has recently drawn attention to the fact that two individuals may exhibit marked degrees of sensitivity to the fragrance of verbenas. A given person, asked to judge between the blossoms of two plants, A and B, may declare the former fragrant but not the latter. From a second person we may get exactly the opposite response. To him B is fragrant but not A.

These differences which were found repeatedly and which seem to have been constant, suggest numerous interesting problems. They also serve to recall that practically nothing is known, or if known, at least not readily accessible to the general reader, on the heritability of differences in the sense of smell.

I have been asked on several occasions what might be expected from a mating involving a

normal person and one devoid of a sense of smell and, until asked the first time, I did not know that there are people who not only can not recognize the difference between odors, but can not recognize odors at all.

Not long ago, an instance of this sort fell into my hands and though the family history is fragmentary, it may possibly, when pieced in with other fragments, acquire some little value.

The case in point is that of a young Russian Jew, a fugitive from Kiev. This man, M. is quite unable to distinguish odors in the usual way. Alcohol, or anything with a sufficiently high percentage of alcohol, is simply "felt." The same thing is true of illuminating gas. Ether and chloroform, when very concentrated, "choke"; when dilute, they produce a "feeling" similar to that caused by flowers. The latter, also, he is aware of, but not in the ordinary way. They emit, very decidedly, "something delicate"; but this something is registered as "a gentle sensation like breathing balmy air." Pepper, again, has "no odor," but it is irritating and its application is followed by the usual effects.

The M. family, one characterized incidentally by much stammering; by an early and complete loss of the incisors; by frequent hernia; a thumb nearly twice the normal width; excessive sex interest; and, very considerable mental powers, contains several individuals abnormal in their sensitivity to odors.

Among the immediate sibs of M. himself, two sisters are normal in this respect. One brother exactly duplicates M. and another has some slight capacity in detecting odors. The mother of these sibs was unable to detect odors and her father, in turn, is reported to have been similarly deficient.

Off-hand there are certain resemblances here to sex-linked inheritance. It is necessary only to assume that the mother had the necessary double dosage in order to have a fairly typical case. Moreover the likelihood of this interpretation being correct is enhanced by a circumstance which to some may appear to cloud

¹ "Unlike Reactions of Different Individuals to Fragrance in Verbena Flowers," A. F. Blakeslee, SCIENCE, N. S., Vol. XLVIII., p. 298.

the issue, namely, M. has a cousin defective in the same sense. This cousin is the daughter of a paternal aunt whose husband, from quite another family, is "smell-blind."

"After making inquiries," M. writes, "among people I know to be from my former place of residence, I came to the conclusion that that locality inbreeds this defect so that quite a number are afflicted with it."

This, in case the trait is sex-linked, is exactly the condition necessary to explain the relatively large number of duplex females herein recorded.

Whatever may or may not be true, the trait has reappeared in one collateral and two direct generations. This is sufficiently frequent to warrant the assumption that "smell-blindness" is heritable, and, from its behavior in this pedigree, it should not be very surprising if further evidence were to place it in the list of sex-linked characters.

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BIOLOGICAL PRINCIPLES IN THE ZOOLOGY COURSE

IN an article entitled "Botany after the War," Professor Bradley M. Davis¹ discusses the changes which a period of war adjustment is likely to bring to the teaching of botany in introductory courses. It is not necessary to read between the lines to detect that Professor Davis will welcome the changes that he anticipates. His interest is chiefly directed to the relegation of morphology—especially the morphology of types—to a less commanding position than it now enjoys. His general thesis is well embodied in his closing interrogation whether the first course will not "come more and more strongly to stand out as one that attempts nothing more than the grounding of fundamental principles and a selection of information with rather definite reference to its general and practical interests, or its broad philosophical bearing."

The writer has not followed the discussion

¹ SCIENCE, N. S., Vol. 48, November 22, 1918, pp. 514-515.

in the *New Phytologist*, but the reference to it made in the cited article leads him to infer that the ideal course in botany has been realized in few, perhaps none, of our institutions. Such an inference with regard to botany seems not at all unnatural to one who is acquainted with the situation in the teaching of its sister science zoology. In the latter subject the type course has long been the dominant one, almost the exclusive one, an inheritance from the time when zoology was a purely morphological science. Several books, it is true, have been in recent years described by their authors as the product of a revolt against the type course; but they mostly contain internal evidence that the laboratory courses which they accompany in the authors' own laboratories still consist largely of the dissection of types. While these teachers recognize that fundamental principles, rather than a knowledge of animal types, is the desirable acquisition of the beginning student, they have not had the courage to make that acquisition possible in the laboratory as well as in the recitation and lecture.

There is no fundamental reason why the work of the laboratory may not be grouped exclusively around general principles instead of around phyla and classes. Why allow demonstration of the tenets of the cell doctrine to be picked up piece-meal in several courses when a brief exercise on a number of unrelated organisms accomplishes the same purpose more completely at the outset? The simpler activities of protoplasm may be studied even by beginners, by introducing at one time organisms from widely different groups. The first-hand study of the principles of ecology does not require a knowledge of large animal associations, but can be satisfactorily based upon two or three forms taken from different phyla; and it is seldom necessary to know regarding any one of these animals more than a small fraction of the anatomical facts which a type course would include, to explain for the beginner the relation of that animal to its habitat. In the type course homology must be taught very incidentally in almost arbitrary connection with some one form, or must wait until