logic work be referred to the National Academy. Should that be done, as we may hope it will be, a broader proposition will be presented than that which has so far been discussed. The administrative question relates to the economy and convenience of executing primary triangulation in one or another connection. The scientific problems involve the ultimate objects of the triangulation. Will the astronomical and geophysical researches in geodesy be promoted by the change? Will the mathematical-physical investigations pertinent to seismology be advanced? Those are the real questions. And we should not forget that the reputation for work of superior accuracy and penetration which the United States has won during half a century of geodetic work presents a standard not easy to maintain in reorganization; nor that the seismologic studies have as their ultimate purpose the task of educating the American people to a better understanding of earthquakes and to better methods of protecting themselves from disasters such as we have hitherto not escaped. The questions are much broader and of more far reaching significance than the estimated attainment of economy of administration.

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RE SPECIATION WITHOUT CLIMATIC CHANGE OR GEOGRAPHIC ISOLATION

IT is an hypothesis rather generally held, and favored by a certain amount of evidence that speciation is largely dependent on changes of environment. A species moves from its center of abundance into diverse peripheral environments which change it somewhat both in structure and habits. Races are formed which are potential species, and become species by chance or other isolation. A study of races shows that such a process is in fact going forward.

There is per contrast little evidence of speciation in a single uniform circumscribed geographic locality. Nevertheless, certain considerations point to a probability that speciation does take place without environmental change and within the confines of a given locality.

We may conceive that a successful species becomes abundant and quickly reaches its saturation point within its range. Within that range there is, however, one outlet whereby it may still further increase, namely, by specializing in two directions. In due time groups of individuals may arise with such divergent habit tendencies. Slowly to be sure, and in the face of cross-breeding, they would diverge ecologically or physiologically up to that point where sufficient fundamental difference is attained to itself furnish a certain amount of isolation. Then the split might come so quickly, the intergradation period have so short a duration in time as to be seldom noticed. There is evidence, mostly circumstantial to be sure, that such speciation does occur and is of considerable importance. It may well be of primary evolutionary importance, for it is not the peculiar isolated environments most favorable for the differentiation of races which give rise to the successful types which spread and become dominant. It is rather the large, uniform, favorable areas which evolve a strong fauna, hard for weaker forms to penetrate, but whence dominant species spread and radiate to the four corners of the earth. The strong fauna of any given moment has probably corresponded to a distribution center of passing time, and it is from such distribution centers that the animals of succeeding epochs seem to be derived. Correlation of the zoogeographical "fauna" with the paleontological "distribution center" will, in the writer's opinion, clarify the path of both sciences.

It will illustrate the above hypothesis of speciation to cite a few instances where it may have pertained. The pilot-fish (*Naucrates*) seems to be a specialized derivative of the genus *Seriola*. Probably all species of this genus as young fishes have the habit, to a greater or less degree of lurking under some "hover," such as a bit of drift-wood, and of following larger fishes. The pilot-fish does so throughout life, and its generic peculiarities are doubtless correlated with this difference. Furthermore it is logical to suppose that habit and correlated physiological differences in this case preceded structural adaptation, and one may easily conceive the initial habit split to have occurred within some such species as the banded rudderfish, *Seriola zonata*.

Take another case, the well-watered Alleghany mountain region is a center of abundance and variety for salamanders of the genus *Desmognathus*. Various more or less separate or intergrading forms occur here living more or less in and out of the water, and with them is found the more exclusively aquatic derivative genus *Leurognathus* (Dunn, 1926, Salamanders of the family Plethodontidae). It certainly seems as if *Leurognathus* had split off as an ecological adaptation in this optimum region of *Desmognathus* abundance, descendent of those *Desmognathus* with the greatest aquatic tendency.

Among birds, the writer has earlier suggested (1919, *Auk*, p. 225–228) that the numerous related species of Warblers of the genus *Dendroica*, nesting together in the Canadian forest, can be more rationally explained as divergence in one locality to take advantage of special habit niches, than as each the result of past geographic isolation, implying later gathering together and fitting the various forms into the single uniform environment where they now occur.

Again take the case of the flying squirrels (*Glaucomys*, etc.): presumably they arose in a region where there were many arboreal squirrels, descendent from those which did the most jumping, rather than isolated, and as a response to some peculiar environment which made it imperative for squirrels to fly.

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WEIGHT AND HUMIDITY

THE article entitled "Weight and Temperature" by Dr. P. G. Nutting, which appeared in SCIENCE of December 30, 1927, states that "a consistent difference of 1.2 mg. was found" between the weight of a lump of gold and the weight of the same lump after it had been rolled into a sheet, and that this difference was "probably due to adsorbed moisture." As there is considerable lack of agreement[1] in the literature regarding the influence of humidity upon weight, it seems desirable to publish the results of an investigation conducted some time ago on this subject.

Since the density of water vapor is less than that of air the hygroscopic condition of the atmosphere may be ascertained by comparing its density with that of dry air. If, therefore, a bulb containing dry air which is in communication with an open vessel containing the drying agent is counterpoised by a pointer, after the fashion of a micro-balance, it is possible to arrange the period of the instrument so that ample sensitiveness for hygrometric work may be assured. This method was tried, using a glass bulb. It was found, however, that the deflections of the instrument were much greater for certain changes in humidity than had been anticipated. An investigation was therefore started to determine whether or not the effect was due to the adsorption of water vapor. The materials used were glass, aluminium, hard rubber, bakelite and quartz. The glass was in the form of a bulb of surface area about 200 sq. cm., the aluminium, hard rubber and bakelite were in sheets of approximately 500 sq. cm. surface, while for the quartz a cup of surface area about 300 sq. cm. was used.

The object to be investigated was placed on the scale-pan of a highly sensitive Becker balance and counterpoised with standard weights. Inside of the balance case were placed two thermometers and two flat dishes which were filled with sulphuric acid of the proper density to assure certain relative humidities inside the balance case. Readings were taken every morning and the acid changed each time. Thus the weight of the object could be determined at relative humidities varying from 10 per cent. to 90 per cent. Care was taken to keep the temperature constant, and the balance was never allowed to oscillate nor was it ever disturbed in any way in the course of the investigation.

It was found that the glass bulb adsorbed 0.5 mg. after having been washed in boiling water and dried over a flame for one hour and 2.3 mg. after having been washed and then dried in air.[2] The quartz cup gained in excess of 1 mg. The gain in weight of the aluminium was about half as much per square centimeter as for quartz. Hard rubber and bakelite were found to be immensely more hygroscopic than these. *But in all cases the amount of water vapor adsorbed varied with the humidity.* Furthermore it was found that the water vapor is adsorbed much more quickly than it is given up. A dry object will adsorb its definite amount of water vapor in an atmosphere of a definite relative humidity in less than two hours; this same object may require a day to lose its water vapor if placed near concentrated sulphuric acid. It was obvious, then, that due to the adsorption of water vapor and this "hysteresis" effect neither the hygrometer mentioned above nor one based on the hygroscopicity of materials is feasible. A successful, continuously indicating, density-difference hygrometer which avoids these disturbing effects was later constructed.[3]

In conclusion we may say that the apparent weight of an object of relatively large surface varies appreciably with humidity and that this fact, as well as the "hysteresis" effect mentioned, should be taken into account in accurate weighings.

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[1] (a) Warburg and Ihmori, *Ann.*, 27, p. 481, 1886. (b) Trouton, *Proc. Roy. Soc.*, A, 79, p. 383. (c) Kuhn, *Deutsche Chemikerzeitung*, 34, p. 1097, 1910. (d) Scheringa, *Pharm. Weekblad*, 56, p. 94, 1919. (e) Metzger, *Glueckauf*, 60, pp. 39–44, 54–60, 94–97, 112–116, 1924.

[2] *Loc.* 1 (a).

[3] *J. Opt. Soc. Am. & Rev. Sc. Instr.*, 13, p. 717, 1926.

LEPIDOPTERA OF NEW YORK

To users of the "List of the Insects of New York" (Cornell Memoir 101): I much regret that in the circumstances of the compilation of the Lepidoptera records of this list it was not possible to publish many of the authorities for collection or determination of the material gathered before 1916. These data are preserved, however, in our files at Cornell University.

I also regret, although I can not accept personal